DOCUMENT RESUME

ED 118 732 CE 005 171

TITLE Aerospace/Aviation Science Occupations.
INSTITUTION North Carolina State Dept. of Public Instruction, Raleigh. Div. of Occupational Education.
PUB DATE 72
NOTE 163p.; Prepared by the Trade and Industrial Education Section

EDRS PRICE MF-$0.83 HC-$8.69 Plus Postage
DESCRIPTORS *Aerospace Education; *Aviation Technology; Career Education; Course Content; *Course Descriptions; *Curriculum Guides; Secondary Education; *Unit Plan; Vocational Education

ABSTRACT

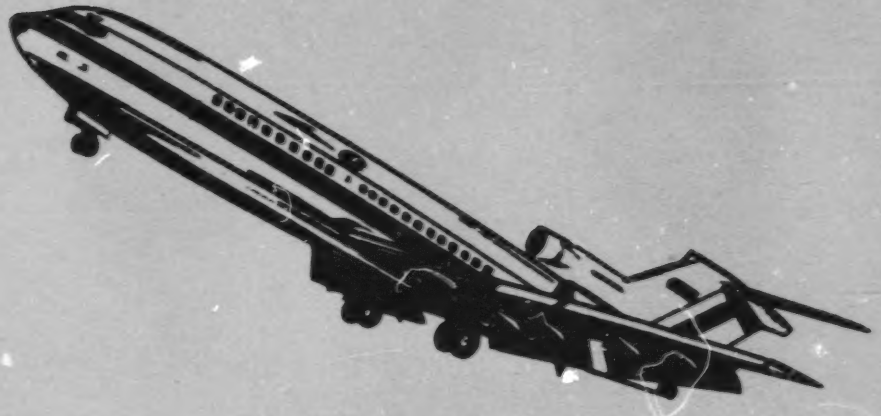
The guide was developed to provide secondary students the opportunity to study aviation and aerospace education from the conceptual and career approach coupled with general education specifically related to science. Unit plans were prepared to motivate, develop skills, and offer counseling to the students of aviation science and occupational aerospace education. The course is designed as a three-year study program comprising Aviation Science One (First Semester, 10 units); Aviation Science Two (Second Semester, 10 units); Occupational Aerospace Three (Second Year, 11 units); Occupational Aerospace Four (Third Year, 14 units). Each unit is outlined under the following headings: teaching unit objectives; recommended prerequisites; teaching unit length; evaluation; teacher competency; instructional materials; general comment; student behavioral objective; and for each objective, content, suggested learning experiences, evaluation techniques, and instructional materials. Texts and audiovisual instructional resources are listed for use in the program as well as tools and equipment needed for the study of aerospace/aviation science. (Author/EC)

**********
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
**********

OCT 1 0 1975

# AEROSPACE/AVIATION SCIENCE OCCUPATIONS

ED118732



Aerospace I 7397
Aerospace II 7398

U.S. DEPARTMENT OF HEALTH EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CE005171

TRADE AND INDUSTRIAL EDUCATION
DIVISION OF OCCUPATIONAL EDUCATION
N.C. DEPT. OF PUBLIC INSTRUCTION RALEIGH 1972

WORK COPY

## ACKNOWLEDGMENTS

The Director and coordinators of the Aerospace Curriculum Development Institute are appreciative for assistance provided by the North Carolina State Aerospace Education Advisory Committee, headed by Mr. Robert N. Flournoy.

For guidance and direction, we wish to thank Mr. Murry Phillips, Mrs. Ernestine Frazier, Mr. Paul Taylor and Mr. Claude Eldridge. Special appreciation goes to industry, business, educational and governmental agencies who sent representatives and materials to our institute.

We also express appreciation to the teachers listed below, who participated in unit development:

Mrs. Marianne Baker, Hoke County High School
Mr. T. P. Buffaloe, Cary Senior High School
Mr. J. W. McLaughlin, Northern Nash Senior High School
Mr. D. L. Scott, Farmville Central High School
Mr. K. G. Wooten, Sr., John D. Hoggard Senior High School

Thanks go to Miss Paula Cash and Miss Claudene Winfree for typing and editing.

W. C. Burrows, Jr., Director

Thomas A. Bridges, Occupational Consultant

David L. Mallette, Science Consultant

# PREFACE

In terms of time for communication and transportation, the world has shrunk. We are able to observe olympic activities taking place in Munich, Germany instantaneously by satellite. We can transact business person to person by telephone three thousand miles away. Man has traveled to the moon and returned in less than ten days. However, for fast mass transportation, the airplane is the prime vehicle. It has played a tremendous part and still is in bringing about interaction of people of diverse cultural and ethnic backgrounds.

This interaction has resulted in great interdependence of people and the concomitant problems. The industry, generated by the airplane, employs one of every fifteen adults earning a living in manufacturing. This industry is growing rapidly in the general, commerce, and military aspects of aviation. The combination of aviation and aerospace promises many new vista for the future.

With the foregoing as backdrop, this guide has been developed to provide secondary students the opportunity to have the specific experience of studying aviation and aerospace education from the occupational and career approach as well as general education, specifically related to science.

It is hoped that these units developed in aviation science and occupational aerospace education will motivate, develop skills, and offer counseling to those students who would like to know more about aerospace education.

# TABLE OF CONTENTS


| | Page |
|---|---|
| Acknowledgements | i |
| Preface | ii |
| Cluster Specifications | v |
| **Aviation Science I - 1st semester** | |
| Unit 1 - Introduction to Aerospace (History) | 1 |
| Unit 2 - Principles of Flight | 5 |
| Unit 3 - Weight and Balance | 8 |
| Unit 4 - Basic Engine Instruments | 11 |
| Unit 5 - Aeronautical Meteorology | 13 |
| Unit 6 - Introduction to Power Plants | 16 |
| Unit 7 - Flight Computer Functions | 19 |
| Unit 8 - Basic Navigation | 22 |
| Unit 9 - Aeronautical Communications | 25 |
| Unit 10 - Physiology of Flight | 28 |
| **Aviation Science II - 2nd semester** | |
| Unit 1 - Principles of Flight | 32 |
| Unit 2 - Weight and Balance | 35 |
| Unit 3 - Instruments and Systems | 38 |
| Unit 4 - Aeronautical Meteorology | 41 |
| Unit 5 - Basic Aircraft Control | 44 |
| Unit 6 - Introduction to Power Plants | 47 |
| Unit 7 - Flight Computer Functions | 50 |
| Unit 8 - Basic Navigation | 53 |
| Unit 9 - Aeronautical Communications | 55 |
| Unit 10 - High Speed Aerodynamics | 57 |
| **Occupational Aerospace III - 2nd year** | |
| Unit 1 - Orientation | 60 |
| Unit 2 - Aircraft Components | 62 |
| Unit 3 - Aircraft Construction Materials | 64 |
| Unit 4 - Aircraft Structures | 66 |
| Unit 5 - Power Plants | 71 |
| Unit 6 - Advanced Aerodynamics | 74 |
| Unit 7 - Aircraft Design and Construction | 77 |
| Unit 8 - Careers and Opportunities | 80 |
| Unit 9 - Rules of Flight | 83 |
| Unit 10 - Introduction to Flight Maneuvers | 86 |
| Unit 11 - Man in Space | 89 |

## TABLE OF CONTENTS

(continued)


Occupational Aerospace IV - 3rd year

Page

Unit 1 - FAA Regulations . . . . . 93
Unit 2 - Aviation Meteorology . . . . . 95
Unit 3 - Advanced Flight Computer . . . . . 98
Unit 4 - Radio Aids and Communications . . . . . 101
Unit 5 - Preflight . . . . . 105
Unit 6 - Airports and Airways . . . . . 107
Unit 7 - Flight Plannings . . . . . 110
Unit 8 - Flight Maneuvers . . . . . 112
Unit 9 - Applied Navigation . . . . . 115
Unit 10 - Basic Airframe and Power Plant Maintenance . . . . . 118
Unit 11 - Optional Flight Training . . . . . 121
Unit 12 - Social, Political, Economic, and Cultural Impact of Aerospace . . . . . 124
Unit 13 - Career Counseling and Career Experience . . . . . 131
Unit 14 - Specialized Group Instruction . . . . . 134

Instructional Resources . . . . . 136

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science

DESCRIPTION: The career cluster of aviation science is a broad-based high school one or two semester laboratory science course designed to give students an insight into the many facets of aviation. The design of the course is one of a group of related teaching units pertaining to the scientific aspects of aviation. It is anticipated that use and emphasis of particular units will depend on the nature of the community and needs of the students. The student is introduced to basic aeronautical topics such as aerodynamics, aircraft components, meteorology, navigation, principles of flight, instruments and systems, power plants, weight and balance, and flight computer functions. The units are designed to begin aviation/aerospace education at the secondary level.

PURPOSES: The purpose of the course is to generate student interest in and an awareness of the impact of the aviation industry upon our society as well as to provide the students with the necessary background for them to make a decision as whether they should pursue an aviation/aerospace occupation. Learning activities designed to accomplish these purposes will be centered around supervised classroom and laboratory experiences as well as actual flight experiences.

CREDITS: The course may be offered as:

1. a one hour, one semester course, with one half unit credit for 90 hours.
2. a one hour, one year course, with one unit credit for 180 hours.
3. two units of credit for 300 hours of scheduled instruction.
4. three units of credit for 450 hours of scheduled instruction.

WORK COPY

SPECIAL OR UNIQUE ASPECTS OF PROGRAM: This program will combine general education and occupational education by utilizing the science cluster as a prerequisite to the occupational clusters. The program includes a cross-country flight of approximately 40 miles for the student.

PHYSICAL FACILITIES: For a comprehensive offering in the area of aviation science, the following facilities are needed:

1. 30 - 35 square feet of classroom space per pupil.
2. Access to a science laboratory with flat top desks.

EQUIPMENT: Basic physical science equipment and classroom, also individual computers are necessary.

RECOMMENDED CLASS SIZE: A maximum of twenty-five students. The physical facilities available will aid in determining the class size. The nature of the offering and expertise of teacher will effectively determine the number of students that can be enrolled.

TEACHER CERTIFICATION: Possess a valid state teaching certificate and:

1. attend North Carolina aviation science workshop. Work toward a valid FAA Private Pilot certificate or higher.
2. or possess a valid FAA Basic Ground Instructor certificate or higher.
3. or have earned six semester hours in an aviation/aerospace course or workshop.

EVALUATION: In addition to periodic evaluation by the Division of Science Education of the North Carolina State Department of Public Instruction, the following self and local evaluations should be made:

1. Are units taught which are relative to the needs of students and the

community?

2.. How many students enter the field of aviation/aerospace after graduation?

3. How many students continue their education in the area of aviation/aerospace after graduation?

UNIT DESIGN: Each unit in the cluster aviation science has a recommended number of hours of instruction that the unit should require. The career cluster of aviation is designed with a total of 180 hours of instruction. The program is constructed in such a way that a student may select to complete from one semester up to the full three year program - i.e. including occupational aerospace II and III.

TEACHING UNITS: Aviation Science I:

1. Instruction to Aerospace (History)
2. Principles of Flight
3. Weight and Balance
4. Basic Engine Instruments
5. Basic Aeronautical Meteorology
6. Introduction to Power Plants
7. Flight Computer Functions
8. Basic Navigation
9. Aeronautical Communications
10. Physiology of Flight

Units of Aviation Science II offer learning experiences that begin where those of Aviation Science I end.

1. Principles of Flight
2. Weight and Balance

WORK COPY

3. Instruments and Systems

4. Aeronautical Meteorology

5. Basic Aircraft Control

6. Introduction to Power Plants

7. Flight Computer Functions

8. Basic Navigation

9. Aeronautical Communications

10. High Speed Aerodynamics

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: The Career Cluster of Occupational Aerospace consists of a varied group of teaching units pertaining to the broad field of aviation/aerospace. Subject matter and learning experiences are designed so units may be used as a complete course, or as separate teaching units. It is primarily a shop course, but may be structured to fit the situation.

PURPOSES: Instruction is provided to acquaint students with the overall impact of aviation/aerospace on society, develop skills in industry related fields, impart knowledge of operations, and familiarize participants with the many opportunities and occupations of the industry.

CREDITS: Occupational Aerospace II is offered as one hour, one year course, with one unit credit for 180 hours. Occupational Aerospace III is offered as a two hour block, one year course, with two units of credit for 360 hours.

SPECIAL OR UNIQUE ASPECTS OF PROGRAM: The program is unique in requiring a general education course as a prerequisite. Units of this course may be used in any course if content is acceptable.

PHYSICAL FACILITIES:

1. Adequate classroom space - 30 - 40 square feet per student.
2. Storage space for teaching materials 100 square feet minimum.
3. Available shop area of 2,500 - 3,000 square feet, with adequate storage for tools, materials and equipment.

RECOMMENDED CLASS SIZE: The number of students should be determined by facilities available, nature of units offered and qualifications of teacher.

EVALUATION: Evaluation will be made on a continuing basis by the Division of Occupational Education of The North Carolina State Department of Public Instruction. In addition, the following evaluations should also be made:

1. Evaluation by State Aerospace Education Advisory Committee.
2. Local evaluation as to needs, interest and results.

UNIT DESIGN: Units of Occupational Aerospace have a suggested number of hours of instruction. It is recommended the local teacher consider this a guide, tailoring his course offering to fit his situation.

WORK COPY

UNITS OF INSTRUCTION:

Occupational Aerospace II

1. Orientation
2. Aircraft Components
3. Aircraft Construction Materials
4. Aircraft Structures
5. Power Plants
6. Advanced Aerodynamics
7. Aircraft Design and Construction
8. Careers and Opportunities
9. Rules of Flight
10. Introduction to Flight Maneuvers
11. Man in Space

Occupational Aerospace III

1. F. A. A. Regulations
2. Aviation Meteorology
3. Advanced Flight Computer
4. Radio Aids and Communication
5. Pre-Flight
6. Airports and Airways
7. Flight Planning
8. Flight Maneuvers
9. Applied Navigation
10. Basic Air Frame and Power Plant Maintenance and Inspection
11. Optional Flight Training
12. The Social, Political, Economic and Cultural Impact of Aerospace
13. Career Counseling and Career Experience
14. Specialized Group Instruction

PROPOSED NORTH CAROLINA TEACHER CERTIFICATION REQUIREMENTS
FOR AVIATION/AEROSPACE EDUCATION

I. FOR AVIATION SCIENCE I AND II

A. Possess a valid state teaching certificate.

AND

1. Attend North Carolina Aviation Science Workshop.
Work toward a valid FAA Private Pilot Certificate or higher.

OR

2. Possess a valid FAA Basic Ground Instructor Certificate or higher.

OR

3. Have earned six semester hours in an aviation/aerospace course or workshop.

II. FOR OCCUPATIONAL AEROSPACE II AND III

A. Possess a valid state teaching certificate.

AND

1. Possess a valid FAA Private Pilot Certificate or higher.

OR

2. Possess a valid FAA Basic Ground Instructor Certificate or higher.

OR

3. Have earned six semester hours in an aviation/aerospace course or workshop and have verified actual operational experience in:

a. Air Traffic Control and/or
b. Aircraft operation as a required flight crew member.
c. Two years experience or equivalent training in aviation field in areas allied to curriculum taught.

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science I OE CODE: 13.0499

TEACHING UNIT NO. 1

TEACHING UNIT TITLE: Introduction to Aerospace (History)

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. show awareness of the courage and sacrifices made by aviation explorers and pioneers, past and present, by written report of some aspect of aviation history.
2. demonstrate various theories of flight proposed by the early pioneers of flight.
3. recognize uses of aviation and space flights and changes they have produced in modern life.
4. list in order the general stages of development of the heavier-than-air and powered craft.
5. construct an aviation history project.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 15 hours (1 hour per day)

EVALUATION: A combination of student-teacher evaluation to include: (1) teacher-student, (2) written test, (3) evaluation of early proposed theories of flight, (4) explain application of flight innovations in daily life, (5) teacher evaluation.

TEACHER COMPETENCY: Knowledge of various aspects of aviation and the role it plays in society - past, present, and future.

INSTRUCTIONAL MATERIALS:

| | | |
|---|---|---|
| Visuals: | Films | - Aeronautical Oddities - FAA<br>From Kitty Hawk to Aerospace - Air Force |
| | Filmstrip | - Aviation History - Sanderson<br>The Airplane Changes America - Eye Gate |
| Book: | | - Aviation/Aerospace Fundamentals<br>Aeroscience |
| Other: | | - Bunsen burner |
| Consumable: | | - Balloons, balsa wood, wax, feathers, sticks, tape, wire, string and tissue paper |

GENERAL COMMENT: To appreciate the contributions aviation has made to modern life, and to anticipate future contributions, one needs to understand the long, cumulative processes involved in the development of modern aviation. To achieve this objective, the unit should include both supervised and individual research and experiments to involve the student rationally, emotionally and physically.

WORK COPY

UNIT TITLE: Introduction to Aerospace (History)

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. trace on paper, in chronological order, the technological development of general, military, and commercial aviation and include 75% of the technical advances.

2. demonstrate his knowledge of early pioneers of flight and subsequent technical advances by building a model of an early aircraft and submitting in writing, along with his model, a structural comparison of his model and a contemporary model.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Early attempts at flight--mythology - design models: Da Vinci, Henson, Stringfellow, Maerwein, Ader | Select and read to class several myths involving flight.<br>Check reasons behind myths.<br>Study pictures and construct models of early flight designs.<br>Read references.<br>See film - Aeronautical Oddities | Test the early theories behind these designs by attempting to fly models of these designs and evaluating the theories on paper. | Mythology books (Edith Menry's Greek Mythology)<br>Balsa wood, string, rubber bands, glue, wire, tissue paper, pipe cleaners<br>Aviation/Aerospace Fundamentals or Aeroscience - texts<br>Aeronautical Oddities - film |
| Lighter-than-air flight attempts by Cavendish, Montogolfier Brothers, Orlandes, Lowe | Study drawings and records of early ballon flight.<br>Fill balloon with hot air and room temperature air. Compare results when balloons are released. | Make oral statement on conclusion. | Use text, enlarged drawings of early balloons<br>Balloons, Bunsen burner, string. |

WORK COPY

UNIT TITLE: Introduction to Aerospace (History)

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Heavier-than-air flight (gliders)<br>Experiments by: Chanute, Lilienthal, Caley, Maloney | Make models of early gliders and compare them to present day models. | | |
| Powered flight: Wright Brothers, Langley, Fokker Sikorsky, Bleriot, Curtiss, Voisin, DeHavilland | Make models of early powered craft and list the structural advances, in chronological order. See filmstrip: Aviation History along with the class, take part in field trips to Smithsonian Institute, Kitty Hawk, or Wings and Wheels, Santee, S. C. Observe antique aircraft and other related objects, visit EAA Fly-In. | Students will list in order the general stages of development of the heavier-than-air and powered craft and submit to teacher for evaluation. Written report relating to any aircraft or historical event covered on the trip. Submit to teacher. | Model kites, glue, balsa wood, tissue paper, string, wires, etc.<br>Aviation History - Sanderson |
| "Kitty Hawk to the Moon" Technical advances and effects on life: During World War I | Study accounts of aerial warfare in World War I. Read stories about World War I aces. See film - From Kitty Hawk to Aerospace - Air Force | | Reference books from library<br>From Kitty Hawk to Aerospace - Air Force |

WORK COPY

UNIT TITLE: Introduction to Aerospace (History)

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Between World Wars I and II | Reports on establishment and effect of: Lindbergh's flight, first commercial flight of passengers, first global flight, Clipper service to Orient, air shows. | Student evaluation and teacher evaluation of written and oral reports. | Resource materials from library, periodicals, text Above and Beyond - encyclopedia. |
| | Compare these early achievements to present day "daily occurrences". | Write paper making comparison between past achievements and present daily occurrences. | |
| Post-war developments | Reports on developments of jets, expansion of airline, role of private aviation. | Student and teacher evaluation of reports. | Resource materials from library, periodicals, text. |
| | See filmstrip: The Airplane Changes America | | The Airplane Changes |
| Aerospace age | Write a paper or make oral reports on practical results of space trips. | Evaluate content of paper. | Resource materials from library, periodicals, text. |
| | | Written test to conclude unit. | |

13-10-2 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations OE CODE: 13.0499

CAREER CLUSTER: Aviation Science I

TEACHING UNIT NO. 2

TEACHING UNIT TITLE: Principles of Flight

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. differentiate the various layers of the atmosphere, troposphere, stratosphere, mesosphere, and thermosphere.
2. identify control surfaces of an airplane: rudder, elevator, and aileron.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 5 hours

EVALUATION: A combination of student-teacher evaluation to include: (1) Pre-test, (2) post-test, (3) student (self) evaluation of constructed substances, (4) teacher observations.

TEACHER COMPETENCY: Working knowledge of principles of flight.

INSTRUCTIONAL MATERIALS:

Visuals: Film - How an Airplane Flies - FAA
Filmstrips: - The Path of Least Resistance - Sanderson
Science of Flight - Sanderson

Book: - Aeroscience - Misenhimer

Other: - Model plane or actual airplane surfaces, vacuum pump bell jar

Consumables: - Cotton - 4 colors and tin can
Paper for construction surfaces

GENERAL COMMENT: This unit is designed to provide students with knowledge of the atmosphere plus an understanding of the control surfaces of an airplane. Students should be provided opportunities to engage in work experiences, exploratory and leadership activities.

WORK COPY

UNIT TITLE: Principles of Flight

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. differentiate the various layers of the atmosphere by placing four different colors of cotton on a globe in the proper order: troposphere, stratosphere, mesosphere, and thermosphere.
2. identify the 3 control surfaces of an airplane by labeling the control surfaces on a model plane.
3. illustrate the decrease in pressure as altitude increases by using a pressure-altitude graph.
4. analyze the relationship of flight and control surfaces by observing air flowing over a variety of paper structures and list in order which surfaces provide greatest lift.

| CONTRAST | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Earth's atmospheric layers troposphere, stratosphere, mesosphere, thermosphere | Observe the teacher illustrating the 4 layers of the atmosphere by placing various colors of cotton on a globe.<br>View filmstrip - The Path of Least Resistance | Have students list the 4 layers of the atmosphere and explain how you would identify each. | Book: Aeroscience- Misenhimer<br>Globe - 4 colors of cotton<br>Filmstrip: The Path of Least Resistance - Sanderson |
| Airplane control surfaces: rudder, elevator, aileron | Observe the teacher illustrating the 3 control surfaces on a model plane.<br>Visit an airstrip and observe the control surfaces of an actual plane.<br>View film - How an Airplane Flies | Have students label the control surfaces on a drawing of an airplane prepared by the teacher. | Model airplane<br>Film: How an Airplane Flies - FAA |

WORK COPY

UNIT TITLE: Principles of Flight

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Relation of pressure and altitude | Construct a pressure-altitude graph. Observe as teacher demonstrates atmospheric pressure with a bell jar. Pump air from a tin can and watch it collapse. View filmstrip - Science of Flight | Teacher observation. | Ruler<br>Bell jar<br>Vacuum pump<br>Tin can<br>Filmstrip: Science of Flight - Sanderson |
| Relation of control surfaces and lift | Fold paper into various shapes: round, square, concave. Force air to flow over paper. Have students observe effects paper goes up, paper goes down, paper goes to side. Use LAP No. 2. | Have students list types of surfaces best suited for airplane structures. | Paper<br>LAP No. 2 |

13 - 10-3 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations OE CODE: 13.0499

CAREER CLUSTER: Aviation Science I

TEACHING UNIT NO. 3

TEACHING UNIT TITLE: Weight and Balance

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. demonstrate a basic knowledge of weight and balance by solving problems using the computation method.
2. explain the importance of the center of gravity by using a model to show effects of misplaced center of gravity on aircraft performance.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 5 hours (1 hour per day)

EVALUATION: (1) Teacher evaluation of written sample problems, (2) student-teacher evaluation of oral explanations, (3) post test.

TEACHER COMPETENCY: Scientific knowledge of weight and balance and its effects on flight.

INSTRUCTIONAL MATERIALS:

| | | |
|---|---|---|
| Visuals: | Filmstrip | - Sanderson's Weight and Balance No. 0213 |
| | Transparencies | - Sanderson's Weight and Balance packet No. 7010 |
| Books: | | - Aeroscience, Aviation/Aerospace Fundamentals, and General Aeronautics |
| Consumables: | | - 1 gallon gas, 1 gallon oil |
| Other: | | - Model plane, scales, teeter-totter |

GENERAL COMMENT: All aircraft are designed for certain load and balance conditions. The responsibility for meeting these requirements rests with the pilot. The teacher must make the student aware of this responsibility in concurrence with FAA regulations.

WORK COPY

UNIT TITLE: Weight and Balance

STUDENT BEHAVIORAL OBJECTIVES: (Teaching Unit Objectives) Upon completion of this unit, the student will be able to:

demonstrate a basic knowledge of weight and balance and the importance of having a proper center of gravity by correctly solving 80% of weight and balance problems using the computation method.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Factors of weight and balance | Read text and view filmstrip or transparencies. Weight and Balance | | Filmstrip: Sanderson's Weight and Balance No. 0213<br>Transparancies: Sanderson's Weight and Balance No. 7010<br>Text: Aeroscience, Chapter 8 or Aviation/Aerospace Fundamentals chapter 6 |
| Importance of weight | Use see-saw to experiment with weight and balance by placing even and uneven weights at equal and unequal distances from the fulcrum. Locate the center of gravity each time. | | |
| Checking gross weight | Weigh 1 gallon of gas and 1 gallon of oil. Using an Owner's Handbook determine a sample gross weight by adding the weight of: the empty aircraft, usable fuel on board, oil on board, removable equipment, occupants, and baggage. Read text. | Evaluation of sample gross weight problems done in class. | Scales, 1 gallon each gas and oil, Owner's Handbook from aircraft.<br>See above text. |

WORK COPY

UNIT TITLE: Weight and Balance

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Importance of balance | Using Model airplane, attach weight (1) at center of gravity, (2) aft of center of gravity, (3) forward of center of gravity. Write conclusions concerning the effect of placement of weight on aircraft performance. | Oral explanation of conclusion concerning placement of balance. | Model |
| Weight and balance theory | Observe teacher's demonstration using a teeter-totter to explain datum, arm, pound-inches, etc. | Check written definition of terms. | Teeter-totter |
| Computation method | After observing sample problems worked on overhead projector, work problems using the computation method. | Evaluate written problems, Post unit test. | See above transparencies |

13 - 10-4 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations OE CODE: 13.0499

CAREER CLUSTER: Aviation Science I

TEACHING UNIT NO. 4

TEACHING UNIT TITLE: Basic Engine Instruments

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. recognize and interpret engine instruments.
2. demonstrate an understanding of scientific principles of selected instruments by diagrams or written explanations.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 5 hours (1 hour per day)

EVALUATION: (1) Pre-test, (2) Post-test, (3) student - teacher oral identification test.

TEACHER COMPETENCY: A general knowledge of engine instrument operation.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Airplane Systems and Instruments - Sanderson
Tachometer, manifold pressure gage, oil pressure gage, oil temperature gage, cylinder head temperature gage, outside air temperature gage, fuel pressure gage, instrument posters from aircraft companies.

Book: - Aeroscience - Misenhimer

GENERAL COMMENT: This unit is necessary to understand basic engine instruments related to flying an airplane.

WORK COPY

UNIT TITLE: Basic Engine Instruments

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objectives) Upon completion of this unit, the student will be able to:

1. recognize and read basic engine instruments.
2. demonstrate an understanding of scientific principles of selected instruments by diagrams or written explanations.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Engine instruments:<br><br>Tachometers<br>Manifold pressure gage<br>Oil pressure gages<br>Oil temperature gages<br>Cylinder head temperature gages<br>Fuel pressure gages | Study posters on instruments.<br><br>Hold and learn to read and interpret the various engine instruments.<br>Observe teacher doing experiments to illustrate oil pressure gage.<br>View film - Airplane Systems and Instruments<br>Visit airstrip and observe instruments in actual aircraft.<br>Read pp. 82 - 86 in text.<br><br>Listen as teacher explains how the various instruments function.<br>View transparencies, discuss scientific principles involved. | Question-answer session with students identifying and interpreting instruments.<br><br>Written examination to conclude unit. | Text: Aeroscience - Misenhimer<br><br>Instruments in Content column<br><br>Materials for experiments<br><br>Filmstrip: Airplane Systems and Instruments - Sanderson<br><br>Transparencies - Sanderson or teacher-constructed |

13 - 10-5 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science I OE CODE: 13,0499

TEACHING UNIT NO. 5

TEACHING UNIT TITLE: Basic Aeronautical Meteorology

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. express a working knowledge of vocabulary and language of weather.
2. make simple forecast by his own observations.
3. know where to go for source of weather information.
4. understand scientific impact in weather forecasting.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours

EVALUATION: (1) Teacher, (2) Written test

TEACHER COMPETENCY: Scientific knowledge of basic weather concept.

INSTRUCTIONAL MATERIALS:

Visuals: Films - Bell T & T - Unchained Goddess
FAA's #AP1 - The Atmosphere, AP3 - Air Masses

Books: - APR, Inc. - Aeroscience
C. N. Van Deventers - General Aeronautics
Sanderson - Aviation/Aerospace Fundamentals

Consumables: - Daily weather maps - Superintendent of Documents Washington, D. C.

GENERAL COMMENT: Upon completing this unit, a student would have a knowledge of weather as it applies to aviation.

WORK COPY

UNIT TITLE: Basic Aeronautical Meteorology

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. express a working knowledge of vocabulary and language of weather.
2. make simple forecast by his own observations.
3. know where to go for source of weather information.
4. understand scientific impact in weather forecasting.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Basic weather vocabulary<br>Reading<br>Speaking | Check daily weather map<br><br>Check daily on weather stories in local news.<br>A. Observe TV weather forecast.<br>B. Make posters on news stories. | Have students report on weather daily.<br>Have students give oral forecast from reading previous reports. | Daily weather map - U. S. Superintendent of Documents, Washington, D.C.<br><br>Texts: APR, Inc. - Aeroscience, C. N. Van Deventer-General Aeronautics<br>Sanderson - Aviation/Aerospace Fundamentals |
| Services provided by the National Weather Service<br>Weather maps<br>Forecasts | Visit local Weather Bureau | Have students write the most important point of interest on visit to Weather Bureau. | |
| Composition of the Earth's atmosphere. | Listen to speakers on weather subjects:<br>A. Military<br>B. Farm Agent<br>C. Weather Bureau personnel | | |
| Temperature<br>Temperature measurment<br>Daily range of temperature<br>Temperatures aloft | Visit to FAA's flight service station.<br>Build model weather station. | | |

WORK COPY

UNIT TITLE: Basis Aeronautical Meteorology

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| | View film on weather - Unchained Goddess<br>Filmstrip: The Atmosphere | | Film: Unchained Goddess Southern Bell T & T<br>Filmstrips: The Atmosphere - FAA AP1<br>Air Masses and Fronts - FAA AP3 |
| Surface temperature distribution | Do experiments to gain an understanding of the instruments used to measure the different weather factors. | Teacher observation of experiments. | |
| Atmospheric pressure<br>Barometers<br>Station pressure<br>Sea Level pressure | Use LAP No. 5 | | Meteorology |
| Wind<br>Basic theory of the general circulation<br>Large wind systems<br>Local winds | View transparencies | | Transparencies from Milliken Company or teacher constructed |
| Moisture<br>Changes of state<br>Moisture content<br>Condensation and sublimation products | | | |
| Stability<br>Lapse rates | Construct a lapse rate chart. | | |
| Stability determinations<br>Effects of stability and instability | | Written unit test | |

13 - 10-6 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations OE CODE: 13.0499

CAREER CLUSTER: Aviation Science I

TEACHING UNIT NO. 6

TEACHING UNIT TITLE: Introduction to Power Plants

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. recognize the seven types of reciprocating aircraft engines.
2. illustrate the four strokes of the engine cycle by drawing diagrams of the various strokes.
3. recognize the seven types of propellers.
4. list the components of a propeller.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours (1 hour per day)

EVALUATION: (1) Pre-test, (2) Post-test, (3) student-teacher evaluation

TEACHER COMPETENCY: An understanding of reciprocating aircraft engines.

INSTRUCTIONAL MATERIALS:

Visuals: - Propeller - Pictures of various propeller types
Pictures of different reciprocating engines
Slides: - Power for Aircraft - C.A.P.
Filmstrip- Reciprocating Engine and Related Systems
Transparencies - The Four Strokes, Propeller, Power Source - Sanderson
Book: - Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to introduce the students to power plants in air craft.

WORK COPY

UNIT TITLE: Introduction to Power Plants

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. recognize the seven types of reciprocating aircraft engines.
2. illustrate the four strokes of the engine cycle by drawing diagrams of the various strokes.
3. list the components of a propeller.
4. recognize the seven types of propellers.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Reciprocating engines:<br>History of development<br>Types<br>Radial<br>Opposed<br>Obsolescent<br>Rotary<br>In - line<br>V - type<br>Double - V<br>Engine cycle<br>Intake<br>Compression<br>Power<br>Exhaust | Read p. 58<br>Listen to teacher explain history of reciprocating engines.<br><br>Read pp. 59 - 60<br>Identify the different reciprocating engines from pictures.<br><br>View Power for Aircraft<br><br>View Power Source and The Four Strokes<br><br>Draw pictures to illustrate cycle.<br>View Reciprocating Engine and Related Systems | Have students identify different engines.<br><br>Evaluate drawings. | Text: Aeroscience- Misenhimer<br><br>Pictures of reciprocating engines.<br><br>Slides: Power for Aircraft - C.A.P.<br><br>Transparency: Power Source The Four Strokes - Sanderson<br><br>Filmstrip: Reciprocating Engine and Related Systems Sanderson |

WORK COPY

UNIT TITLE: Introduction to Power Plants

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Propellers<br>Theory<br>Momentum<br>Blade element<br>Tip speed<br>Propeller components<br>Hub<br>Blade<br>Tip<br>Leading edge<br>Trailing edge<br>Pitch<br>Types<br>Fixed pitch<br>Metal<br>Wood<br>Adjustable<br>Pitch<br>Variable pitch<br>Electric<br>Hydraulic<br>Mechanical<br>Two-position<br>Constant speed<br>Reversible pitch | Read pp. 88 - 93<br><br>Observe an actual propeller and locate the various propeller types.<br><br>Identify pictures of the various propeller types.<br><br>View Propeller | Have students identify propeller types.<br><br>Written exam to conclude unit. | Propeller<br><br>Pictures of various propeller types.<br><br>Transparency: Propeller - Sanderson |

13 - 10-7 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science I OE CODE: 13.0499

TEACHING UNIT NO. 7

TEACHING UNIT TITLE: Flight Computer Functions

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. make decisions involving flight computations with confidence through basic knowledge of the computer.
2. use the flight computer in planning a cross - country flight.
3. solve calculation and conversion problems involved with flight.
4. describe relationship between the computer, graphs and slide rules.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours (1 hour daily)

EVALUATION: Combination teacher - student to include (1) teacher evaluation of problems solved - oral and written, (2) student evaluation of other students' explanation of use of computer, (3) student - teacher evaluation of student planned cross-country.

TEACHER COMPETENCY: Ability to use slide rule and computer efficiently.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip: - Basic Flight Computer Sections A and B
Transparencies: - Computer side of Sanderson Flight Computer (movable scales)

Book: - Aviation/Aerospace Fundamentals
General Aeronautics

Equipment: - Computer for each student and teacher
Classroom size computer

GENERAL COMMENT: Pre-flight and in-flight computations require much of a pilot's time and energy. The flight computer enables the pilot to make these computations quickly and easily. Every pilot should have a thorough understanding of the flight computer in order to fully utilize his capabilities.

WORK COPY

UNIT TITLE: Flight Computer

STUDENT BEHAVIORAL OBJECTIVES: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. demonstrate understanding of and proficient use of calculator side of the computer by working problems involving multiplication and division; time - distance - speed; fuel consumption; temperature and mileage conversions; and multipart problems.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Calculation side: | | | |
| A, B, C scales | Observe demonstration of use and location of A, B, and C scales. View Basic Flight Computer | | Text: General Aeronautics Aviation/Aerospace Fundamentals Aeroscience Filmstrip: Basic Flight Computer Section A |
| Changing values Speed index | Explain location and use of scales, index, and explain changing values. | Evaluate students' explanation of scales and changing values. | |
| Multiplication and Division | Observe demonstration of and solve sample problems of calculation. View Flight Computer | Teacher evaluation of written problems. | Text and Section A of filmstrip by Sanderson - Flight Computer Transparency: Sanderson 7136 - Computer Side |
| Time, distance, speed Fuel consumption and gallons per hour True air speed | Read in text and observe demonstrations or problems. Work time, speed, distance and fuel problems encountered in flight from point A to point B. View Computer Side | Teacher evaluation of written problems | |

WORK COPY

UNIT TITLE: Flight Computer

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Nautical and statute conversion | View Basic Flight Computer<br>Compare distances from point A to points B, C, and D in nautical and statute miles.<br>Observe demonstration of and do sample conversions. | | Filmstrip: Basic Flight Computer Section B<br>Text |
| Temperature conversions | Chart daily temperatures in centigrade and farenheit.<br>Read text and do sample conversion problems. | Oral test of conversion problems with each student doing 1 temperature and 1 nautical - statute conversions. | |
| Multipart problems | Plan a cross - country flight and do all calculator side computer problem encountered. | Evaluate written problems involved in the predetermined flight.<br>Unit test. | Sectional chart |

13 - 10-8 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science I OE CODE 13.0499

TEACHING UNIT NO. 8

TEACHING UNIT TITLE: Basic Aerial Navigation

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. explain different types of navigation.
2. read compass.
3. read navigational map (sectional).
4. work simple wind drift problem by mathematical computation.

RECOMMENDED PREREQUISITES: None - Aviation Science is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours (1 hour per day)

EVALUATION: (1) Teacher evaluation, (2) student - teacher evaluation, (3) written test

TEACHER COMPETENCY: Having working knowledge of aerial navigation.

INSTRUCTIONAL MATERIALS:

Visuals: Films: - FAA's Using the Airspace: Navigation and Communication

Filmstrip: - Navigation and the Weather

Books: - APR. Inc. - Aeroscience
C. N. Van Deventer - General Aeronautics
Sanderson - Aviation/Aerospace Fundamentals

Equipment: - Plotter - ruler - compass - globe

Consumables: - Maps and charts (city, state, sectional, World Air Charts, map of world variation)

GENERAL COMMENT: This unit is designed to prepare students with a workable knowledge of navigation, to read charts and work simple wind drift problems.

WORK COPY

UNIT TITLE: Basic Aerial Navigation

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. explain different types of navigation.
2. read a compass.
3. read a navigational map (sectional).
4. work simple wind drift problems by mathematical computations.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Globe<br>Position in space<br>Revolution<br>Rotation<br>The Earth's Axis<br>Grid System<br>Prime meridian<br>Parallel (Equator)<br>Longitude<br>Latitude | Listen to explanation.<br><br>Refer to text.<br>Locate positions on chart or globe using coordinates | Written exercise finding position on charts. | Globe maps<br>City<br>State<br>Sectional<br>World Air Charts<br><br>Texts:<br>APR, Inc. - Aeroscience<br>C. N. Van Deventer - General Aeronautics<br>Sanderson - Aviation/ Aerospace Fundamentals<br>Maps:<br>Mecator<br>Conic<br>Gnomonic<br>Polar |
| Projections<br>Mercator<br>Conic (Lambert)<br>Gnomonic<br>Polar | Read references.<br>Study examples. | | |
| Charts<br>Chart symbols<br>Populated areas<br>Hydrographic features | View Filmstrip: Aeronautical Charts<br>Study | Written exercise on symbols | Aeronautical Charts - Sanderson |

WORK COPY

UNIT TITLE: Basic Aerial Navigation

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Use of compass<br>Deviation<br>Variation | Point out directions using compass. | Have student explain points of compass. | Compass<br>Map of world variation |
| Methods used in navigation<br>Pilotage<br>Dead reckoning<br>Radio<br>Celestial | View filmstrip: Dead Reckoning Navigation<br>Plot and draw course on sectional map. | Have student explain orally different types of basic aerial navigation. Have student work simple wind drift problem. | Filmstrip: Dead Reckoning Navigation - Sanderson<br>Sectional map, plotter |
| Navigation from point of departure to destination by pilotage and dead reckoning | Listen to resource person discuss navigation. | Written unit examination. | |

13 - 10-9 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science I OE CODE: 13.0499

TEACHING UNIT NO. 9

TEACHING UNIT TITLE: Aeronautical Communications

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. demonstrate proper microphone technique by transmitting given message to tape recorder.
2. illustrate two-way radio communication with 100% proficiency in identifying major components, using blank diagrams.

RECOMMENDED PREREQUISITES: None - Aviation Science I is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 5 hours (1 hour per day)

EVALUATION: Student participation using microphone and recorder.
Teacher observation and comments.
Use Post test for entire unit.

TEACHER COMPETENCY: A knowledge of two-way communication.

INSTRUCTIONAL MATERIALS:

| | | |
|---|---|---|
| Visuals: | Film | - Basic Radio Procedures for Pilots - 16mm FAA film #FA-902 |
| | Filmstrip | - Sanderson filmstrip recording - Communications |
| Books: | | - Aviation/Aerospace Fundamentals |
| Equipment: | | - Microphone and tape recorder<br>Aircraft radio, posters or diagrams |

GENERAL COMMENT: This unit will acquaint students with basic aircraft communications.

WORK COPY

UNIT TITLE: Aeronautical Communications

STUDENT BEHAVIORAL OBJECTIVES: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. demonstrate proper microphone technique by transmitting given message to tape recorder. Student should record 100% of content and rate 75% procedure.
2. illustrate two-way radio communication with 100% proficiency in identifying major components, using blank diagrams.
3. demonstrate ability to tune simple radio, getting steps in proper sequence, by using radio or mock-up.
4. recite basic radio phraseology.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Correct microphone technique<br>Hold microphone near lips; speak directly into mike. | Observe teacher demonstrating correct microphone procedure. Student practice with dead mike before class members. | Have student speak prepared message into microphone, tape message for playback. | Microphone<br>Tape recorder<br>Text: Aviation Fundamentals<br>Film: Basic Radio Procedure for Pilots - FAA #FA902 |
| Two-way radio communications: voice vibrations are converted to radio waves by transmitter for movement through atmosphere to receiver for conversion. | 1 - study diagrams of two-way voice transmitter and receivers.<br>2 - listen to explanation of radio transmission by resource persons.<br>3 - read references. | Student will draw diagram of voice transmitting and receiving station. Identifying major components. | Text: Aviation Fundamentals or Aeroscience<br>Diagrams or transparencies of transmitting and receiving stations.<br>Sanderson's filmstrip and recording Communications |
| Tune radio - power switch on, select frequency, adjust sound. | Teacher supervised student demonstrations of radio tuning.<br>View Sanderson filmstrip on Communications | | Radio or mock-up of radio controls<br>Transparencies or chalk board diagrams. |

WORK COPY

UNIT TITLE: Aeronautical Communications

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Radio phraseology | Listen to recordings of correct phraseology.<br>Record practice messages of phraseoloby.<br>Study references - use LAP No. 9 if available. | Assign messages for class recording, play back before group. | Tower recordings - order from Aviation Supply<br>Text: Aviation Fundamentals or Aeroscience |
| License requirements | View film Basic Radio Procedure for Pilots | Unit post test | Text: Aviation Fundamentals |

13 - 10-10 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science I

TEACHING UNIT NO. 10

TEACHING UNIT TITLE: Physiology of Flight

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. describe atmospheric effects on respiration and circulation.
2. demonstrate physiological changes due to pressure differences.
3. summarize atmospheric effects on vision.
4. describe physiological effects of noise, vibration, and highspeed flight.

RECOMMENDED PREREQUISITES: None - Aviation Science is a semester course serving as a prerequisite for Aviation Science II and Occupational Aerospace.

TEACHING UNIT LENGTH: 15 hours (1 hour per day)

EVALUATION: (1) Pre-test, (2) Post-test, (3) teacher - student evaluation (4) teacher initiated question - answer period.

TEACHER COMPETENCY: A working knowledge of atmospheric effects on the body at different altitudes.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Physiology of Flight - Sanderson
Films - RX for Flight - FAA-606
Medical Facts for Pilots - FAA-01-70
Charlie - FAA-618

Books: - Aeroscience - Misenhimer
Aviation/Aerospace Fundamentals - Sanderson

Equipment: - Swivel chair, charts on respiration, circulation, ear, eye, ear muffs and plugs, camera, writing samples at different altitudes.

Consumables: - Colored chalk.

GENERAL COMMENT: Unit designed to teach atmospheric effects on the body at different altitudes.

41

WORK COPY

UNIT TITLE: Physiology of Flight

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. describe atmospheric effects on respiration and circulation by a written report submitted to the teacher explaining hypoxia and hyperventilation.
2. summarize atmospheric effects on vision by presenting an oral report to be judged by the teacher.
3. describe physiological effects of noise, vibration on flight by listing the effects and submitting them to the teacher.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Atmospheric effects on respiration and circulation. | Illustrate the four physiological divisions of the atmosphere. | Question - Answer period | Colored chalk<br>Book: Aeroscience - Misenhimer |
| | Review circulation and respiration charts. | Question - Answer period | Charts on human circulation and respiration. |
| Physiological changes due to pressure differences. | Define and discuss hypoxia and hyperventilation - use pressure differences students have experienced Example - driving up a mountain | Written examination<br>Discussion | |
| | Review anatomy of the ear | Have students explain why ears "pop". | Chart on anatomy of ear |
| Atmospheric effects on vision. | | Question - Answer period | Camera - chart on anatomy of eye.<br>Filmstrip: Physiology of Flight - Sanderson |

WORK COPY

UNIT TITLE: Physiology of Flight

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Physiological effects of noise, vibrations, and highspeed flying | Describe how sound is measured.<br>Describe effects of different noise levels on ears.<br>List protective devices<br>Illustrate how vibration blurrs vision.<br><br>Simulate sensory illusion of flight by having student "ride" swivel chair. | Do exercise to illustrate how vibration affects vision.<br>Written examination | Ear muffs and ear plugs<br><br>Swivel chair |
| Decreasing atmospheric pressure causes physiological changes: hypoxia and hyperventilation | Listen as the teacher explains the physiological divisions of the atmosphere:<br>1. Physiological zone<br>2. The physiological deficient zone<br>3. The partially and totally space equivalent zone<br>4. Outer space<br>View filmstrip Physiology of Flight<br>Review charts on circulation and respiration<br>Listen as teacher defines and discusses hypoxia and hyperventilation.<br>Review chart on ear | | Book: Aeroscience - Misenhimer<br><br>Filmstrip: Physiology of Flight - Sanderson<br>Charts on human circulation and respiration<br><br>Chart on ear |

WORK COPY

UNIT TITLE: Physiology of Flight

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| | Recall pressure changes you have experiences - Example: driving up a mountain.<br>View Rx for Flight<br>Use LAP No 10 | Have students explain why ears "pop". | Film: Rx for Flight - FAA 606 |
| Eyes - most important sensory faculty | Compare your eye to a camera.<br>Review charts on anatomy<br>Determine your dominant eye and locate your blind spot according to the instructor.<br>Use LAP No. 10<br>View film: Medical Facts for Pilots | Written essay comparing eye to camera<br>Why do we have a dominant eye and a blind spot | Camera<br>Charts on anatomy of eye<br>Film: Medical Facts for Pilots - FAA |
| Effects of vibration and noise | Observe teacher demonstrate and explain how sound is measured.<br>Read effects of different noise levels.<br>View film: Charlie<br>Experience how vibration blurrs vision by running in place.<br>Observe protective devices for eyes and ears<br>Simulate sensory illusion of flight by "riding" in a swivel chair.<br>Use LAP No 10 | Oral reports assigned by teacher<br>Written examination | Film: Charlie - FAA618<br>Ear muffs and plugs<br>Swivel chair |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE 13.0499

TEACHING UNIT NO. II - 11

TEACHING UNIT TITLE: Principles of Flight

TEACHING UNIT OBJECTIVES: Upon completion of this unit the student will be able to:

1. describe three experiments to illustrate Bernoulli's Axes.
2. list four forces acting on a plane in flight.
3. list and describe three exis of an aircraft.

RECOMMENDED PREREQUISITES: Aviation Science I - Aviation Science I is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours (1 hour per day)

EVALUATION: (1) Pre-test, (2) Post-test, (3) student - teacher evaluation of experiments.

TEACHER COMPETENCY: An understanding of theory of flight.

INSTRUCTIONAL MATERIALS:

Visuals: Transparencies - (Make)
Filmstrip - Science of Flight - Sanderson
Films - Air Flow - Forces Acting on an Air Foil
Air foil - roller skates and model plane
Book: - Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to aid the student in understanding how and why a plane flies.

WORK COPY

UNIT TITLE: Principles of Flight

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. describe three experiments to illustrate Bernoulli's principle.
2. draw six airfoil development phases.
3. relate Newton's third law to angle of incidence, angle of attack, and attitudes at which an airplane stalls.
4. list four forces acting on a plane in flight.
5. list and demonstrate the three axes of an aircraft by using a model plane.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Theories of flight | Observe the teacher perform several experiments to illustrate Bernoulli's principle.<br>View film: Aerodynamics - Air Flow<br>Use LAP No. 11 | Have students summarize Bernoulli's principle. | Text: Aeroscience - Misenhimer<br>Materials needed to perform experiments.<br>Film: Aerodynamics - Air Flow |
| Air Foils | Complete assignments prepared by teacher to illustrate relation between Bernoulli's principle and air foils. | Have students relate Bernoulli's principle and air foils | Air foils - ex. cross section of wings of different types |
| Newton's third law | Experience Newton's third law by pushing against a wall with roller skates on your feet. | Have students explain how Newton's third law helps create lift. | Roller skates |
| Attitudes and stalling | Compare angle of attack to water skiing. | Let students explain when a plane might stall. | |

WORK COPY

UNIT TITLE: Principles of Flight

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Angle of Attack<br>Angle of Incidence | Read pp. 11 - 24<br>Differentiate between angles of attack and angle of incidence.<br>View filmstrip - Science of Flight<br>Use LAP No. 11 | Let students explain when a plane might stall. | Film: Science of Flight - Sanderson |
| Four forces acting on a plane in light:<br>lift<br>thrust<br>drag<br>gravity | View transparencies on four forces.<br>Observe as teacher demonstrates with a model plane the four forces acting on a plane in straight and level flight.<br>View transparencies on axis. | Have students label four forces on drawing of aircraft. | Transparencies<br>Model plane |
| Axes of an aircraft:<br>vertical axis (yaw)<br>Longitudinal axis (roll)<br>Lateral axis (pitch) | Observe as teacher illustrates with a model plane the three axis of an aircraft.<br>View film: Aerodynamics - Forces Acting on an Airfoil<br>Use LAP No. 11 | Have students label and draw 3 axis on sketch of aircraft.<br>Written exam to conclude unit. | Film: Aerodynamics - Forces Acting on an Airfoil - Air Force |

13 - 10-II-12 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE 13.0499

TEACHING UNIT NO. II - 12

TEACHING UNIT TITLE: Weight and Balance

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. interpret weight and balance charts and graphs.
2. solve sample loading problems using data from owners manual.
3. state the effects of over loading in terms of roll, pitch and yaw.
4. demonstrate weight and balance by locating weights on a model plane.

RECOMMENDED PREREQUISITES: Aviation Science 1 - Aviation Science is a two semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 7 hours (1 hour per day)

EVALUATION: Teacher observation - problems - post unit test.

TEACHER COMPETENCY: A working knowledge of physics.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Weight and Balance A,B, and C - Sanderson

Transparencies - teacher constructed

Books: - Aviation/Aerospace Fundamentals - Sanderson
Aeroscience - Misenhimer
owners manual

Equipment: - Meter stick - model plane - weights - Load Adjuster

Consumables: - String - Loading - graphs - Loading tables - Weight and Balance forms.

GENERAL COMMENT: This unit is designed to acquaint students with problems of weight and balance as they relate to flying an aircraft.

WORK COPY

UNIT TITLE: Weight and Balance

STUDENT BEHAVIORAL OBJECTIVES: (Teaching Unit Objectives) Upon completion of this unit, the student will be able to:

1. interpret weight and balance charts and graphs.
2. solve sample loading problems using data from owners manual.
3. state the effects of over loading in terms of pitch, yaw, and roll.
4. demonstrate weight and balance by locating weights on a model plane.

| CONTENT | SUGGESTED LEARNING EXPERIENCE | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Graph Method | Study sample graph and work sheet. | | Text - Aviation/Aerospace Fundamentals - Sanderson |
| | Solve problems in weight and balance using two methods.<br>1. Graph<br>2. Moment equation | Evaluate problems. | Aeroscience - Misenhimer |
| | View - Weight and Balance Part A | | Filmstrip - Weight and Balance Parts A, B, and C. |
| | Load a real plane using owners manual. | Check weight and Balance forms for accuracy. | Owners manual |
| Table - Method | Listen as FAA Representative discusses regulations governing saftey in aircraft loading. | | Meter stick.<br>Weights.<br>Model plane.<br>String. |
| | View - Weight and Balance Part B. Locate fulcrum by calculation. | Teacher observation. | |

WORK COPY

UNIT TITLE: Weight and Balance

| CONTENT | SUGGESTED LEARNING EXPERIENCE | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Load Adjuster | Locate fulcrum using suspended meter stick and weights.<br><br>Locate weights on suspended model plane and observe effects.<br><br>View - Weight and Balance Part C<br><br>View - teacher constructed transparencies. | Post unit test | Transparencies.<br><br>Loading graphs.<br>Loading tables.<br>Load Adjuster.<br>Weight and Balance forms. |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE 13.0499

TEACHING UNIT NO. II - 13

TEACHING UNIT TITLE: Instruments and Systems

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. read and interpret basic flight instruments by using actual aircraft instruments or transparencies.
2. draw and explain the operations of the pitot and vacuum systems.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 8 hours (1 hour per day)

EVALUATION: (1) Identification, (2) written test, (3) teacher observation.

TEACHER COMPETENCY: Basic knowledge of flight instruments and systems.

INSTRUCTIONAL MATERIALS:

Visuals: Transparencies - Flight Instruments
Airspeed indicator- Altimeter - Vertical Speed indicator - Magnetic compass - Turn and Slip Indicator - Directional gyro - Artificial Horizon - Pitot Static System - Vacuum system - Sanderson

Filmstrip - Flight control systems and Instruments - Sanderson

Book: - Aeroscience and Aviation/Aerospace Fundamentals

GENERAL COMMENT: This unit is designed to introduce the students to the purpose and functions of the flight instruments and systems.

WORK COPY

UNIT TITLE: Instruments and Systems

STUDENT BEHAVIORAL OBJECTIVES: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. read and interpret basic flight instruments by using actual aircraft instruments.
2. draw and explain the operation of the pitot and vacuum systems.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Flight Instruments:<br>1. Airspeed Indicator | View - Flight Control Systems and Instruments | | Aviation/Aerospace Fundamentals - Sanderson<br>Text - Aeroscience - Misenhimer<br>Filmstrip - Flight Control Systems and Instruments Sanderson |
| 2. Altimeter | Practice Altimeter reading exercise. | | |
| | | Written exercise on flight instruments. | |
| 3. Vertical speed indicator | Read and interpret transparencies. of various flight instruments. | | Transparencies - Flight Instruments<br>Airspeed Indicator<br>Altimeter<br>Vertical Speed Indicator |
| 4. Magnetic Compass | Study FAA Exam - O - Grams of the Magnetic Compass. | | Magnetic compass<br><br>FAA Exam-O-Gram |

WORK COPY

UNIT TITLE: Instruments and Systems

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Gyro Flight Instruments:<br><br>1. Turn and Slip Indicator<br><br>2. Directional Gyro<br><br>3. Artificial Horizon<br><br>Systems:<br>1. Pitot<br>2. Vacuum | View transparencies on gyro flight instruments.<br><br>Visit local airport, observe various instruments and systems in a actual aircraft.<br><br>View transparencies on pitot and vacuum systems. Draw diagram of pitot system and explain operation. | Evaluated diagrams.<br><br>Post unit examination. | Transparencies - Turn and Slip Indicator<br>Directional Gyro<br>Artificial Horizon<br>Pitot Static System<br>Vacuum System |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE 13.0499

TEACHING UNIT NO. II - 14

TEACHING UNIT TITLE: Aeronautical Meteorology

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will will be able to:

1. collect and classify data.
2. apply collected data to future forecase.
3. give observations on air masses and fronts.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 15 hours (1 hour per day)

EVALUATION: Teacher observation.
Written tests as required.

TEACHER COMPETENCY: Basic knowledge of physics.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Meteorology series - Sunderson
FAA - Fan - 103 The Cold Front
Fan - 104 The Warm Front
Fan - 101 Fog and low ceiling clouds - Avection Fog and ground Fog
Fan - 102 Fog and low ceiling clouds - Upslope Fog and Frontal Fog

Books: - C. N. Van Deventer General Aeronautics
APR. Inc. Aeroscience
Sanderson- Aviation/Aerospace Fundamentals

Consumables: - Daily Weather maps Superintendent of Documents, Washington, D.C.

GENERAL COMMENT: Student will collect data on weather and make observations on air masses and fronts.

WORK COPY

UNIT TITLE: Aeronautical Meteorology

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. collect and classify data.
2. apply collected data to future forecast.
3. give observations on air masses and fronts.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATIONS TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Basic laws of meteorology<br>Earth's Science<br>Physical Science | Study assigned text.<br>View Sanderson Filmstrip Weather Theory | Draw diagram of earth's atmosphere as it applies to man. | Text.<br>C. N. Van Deventer<br>General Aeronautics<br>APR, Inc. Aeroscience<br>Sanderson's<br>Aviation/Aerospace Fundamentals |
| Clouds<br>Families and types<br>Combinations | Study Cloud Chart. | | |
| Atmosphere<br>Composition of air<br>Temperature<br>Pressure<br>Dew Point and Humidity<br>Stability and lapse | Observe and classify clouds on different days | Give Oral Observations regarding frontal weather | Films:<br>FAA - Meteorology<br>Fan - 103 "The Cold Front"<br>Fan - 104 "The Warm Front". Fan - 101 Fog and Low Ceiling Clouds - Avection Fog and Ground Fog<br>Fan - 102 "Fog and Low Ceiling Clouds Slope Fog and Frontal Fog" |
| Air Masses and Fronts<br>Classification and characteristics.<br>Fronts<br>Cold<br>Warm<br>Stationary front<br>Occluded | Read references<br>View - The Cold Front<br>View - The Warm Front | | |
| | Operate model weather station and keep records of same. | | Cloud Chart |

WORK COPY

UNIT TITLE: Aeronautical Meteorology

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATIONS TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| | Observe frontal weather and classify. | | Daily weather maps superintendent of documents, Washington, D.C. |
| Atmospheric Conditions<br>Thermals<br>Fog<br>Density Altitude<br>Turbulence<br>Icing<br>Hail<br>Barometric Pressure | View Films:<br>Fan - 101 "Fog and Low Ceiling - Avection Fog and Ground Fog"<br>Fan - 102 Fog and Low Ceiling - Upslope Fog and Frontal Fog" | Written Symbol Exercise | Weather station model kit<br>Meteorology series Filmstrips and Recordings Sanderson |
| Weather Symbols | Study References | | |
| Teletype Reports<br>Sequence<br>Winds aloft | View Filmstrip Weather Reports<br>Listen to resource person | Have student read simple sequence report<br>Written Unit Test | Teletype reports Weather services. |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II

TEACHING UNIT NO. II - 15

TEACHING UNIT TITLE: Basic Aircraft Control

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. illustrate the effect of control surfaces on flight of a fixed wing aircraft by use of a model.
2. show in writing a basic knowledge of the principle involved in the flight of rotary wing aircraft.
3. show in writing a general knowledge of the principle involved in introduction to wingless flight.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 5 hours (1 hour per day)

EVALUATION: (1) Teacher - student evaluation of wind tunnel test.
(2) Teacher evaluation written findings.
(3) Post-test.

TEACHER COMPETENCY: Working knowledge of principles involved in aircraft control.

INSTRUCTIONAL MATERIALS:

Visuals: Films - Flight Without Wings
How an Airplane Flies
Beyond the Stick and Rudder
Helicopter Orientation
Filmstrip - The Dawning Space Age

Books: - General Aeronautics
Aviation/Aerospace Fundamentals
Aeroscience

Equipment: - Wind tunnel
Model plane

GENERAL COMMENT: The knowledge involved with basic aircraft control is also basic to most other aspects of aviation. Therefore, to fully understand flight, the understanding of what controls flight is essential.

WORK COPY

UNIT TITLE: Basic Aircraft Control

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. illustrate, by using a model and wind tunnel, the effect of 90% of the control surfaces of a fixed wing aircraft.
2. show a basic knowledge of the control of rotary wing aircraft by discussing in writing 75% of the principles involved in rotary wing flight.
3. summarize on paper 70% of the principles involved in wingless flight.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Fixed wing aircraft - primary systems: aileron<br>elevator and<br>stabilator<br>rudder or<br>rudder-vator<br><br>secondary systems: flaps<br>trim tabs<br>spoilers<br><br>Rotary wing aircraft:<br>Helicopters and gyrocopters<br>Regimes of flight<br>Gyroscopic precession<br>Collective pitch<br>Cyclic Pitch<br>Dis-symmetry of lift<br>Axis of rotation<br>Coriolis effect | Read in text<br>Listen to teacher explanation of how control systems work.<br>Use a wind tunnel and model plane with movable control surfaces, or mock-ups of control systems to demonstrate how the controls effect flight.<br>Write results.<br><br>Read text.<br>View Film - How an Airplane Flies<br>Listen to resource person explain characteristics of the helicopter.<br>View - Beyond the Stick and Rudder.<br>View - Helicopter Orientation | Teacher-student evaluation of wind tunnel text.<br><br>Evaluation of written results of test. | General Aeronautics - Pages 92 - 98<br><br>Aviation/Aerospace Fundamentals pages 5-5 through 5-12<br><br>Wind tunnel<br>Model plane<br>Mock-up of control systems<br><br>"How an Airplane Flies" - parts III-VI Air Force<br>"Beyond the Stick and Rudder" Air Force<br><br>Text: Aeroscience - Chap. 10<br><br>General Aeronautics - Chap.17<br><br>Film - "Helicopter Orientation Air Force<br><br>Experienced helicopter pilot |

WORK COPY

UNIT TITLE: Basic Aircraft Control

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Missiles and Spacecraft<br>1. Thrust required.<br>2. Guidance system. | View Film. Flight Without Wings.<br>Read text.<br>Listen to resource personnel explain basic rocketry and wingless flight.<br>View filmstrip. The Dawning Space Age. | Post test of unit. | Flight Without Wings -<br>Aeroscience - Unit 7<br>Aviation/Aerospace Fundamentals chapter 15<br>Resource person.<br>The Dawning Space Age - filmstrip - CAP |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE: 13.0499

TEACHING UNIT NO. 11 - 16

TEACHING UNIT TITLE: Introduction to Power Plants

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. demonstrate the reaction theory by performance before group exhibiting a working knowledge of Newton's third law.
2. comment on and compare reaction engines by listing some advantages and disadvantages of each.
3. list historical developments leading to the present day practical reaction engine, selecting developments from random group.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours (1 hour per day)

EVALUATION: Written test - teacher observation - post unit test.

TEACHER COMPETENCY: Basic scientific knowledge of power plants and ability to locate reference materials.

INSTRUCTIONAL MATERIALS:

| | |
|---|---|
| Visuals: | Model of Wankel Engine |
| Film | - ABC's of Jet Propulsion |
| Filmstrip | - Don't Build that Rocket Alone |
| Slide Series | - Power for Aircraft |
| Books: | - Aeroscience, General Aeronautics, Exploring in Aerospace Rocketry |
| Equipment: | - Rocket kit |
| Consumables; | - Launched rockets |

GENERAL COMMENT: This unit will give the student a basic understanding of the reaction theory and the application of this theory to engines of this era.

WORK COPY

UNIT TITLE: Introduction to Power Plants

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Reaction engines - reaction engine development. | View 16mm film - ABC's of Jet Propulsion<br>Read references. | Written test on developments. | 16mm film - ABC's of Jet Propulsion<br>Aeroscience |
| Reaction theory. | Relate reaction performance to Newton's third law by balloon on wire or can with water activity.<br>Use LAP No. 16 | Teacher will evaluate student experiment as to knowledge application. | LAP No. 16 |
| Air breathing engines.<br>Non-air breathing engines. | View slides, Power for Aircraft<br>Read references. | | Slide series - Power for Aircraft - CAP<br>Exploring in Aerospace Rocketry - NASA |
| Solid fuels.<br>Liquid fuels. | Listen to explanation of advantages and disadvantages of solid and liquid fuels.<br>Read references.<br>View Filmstrip - Don't Build that Rocket Alone.<br>Construct Rocket. | | Text: Aeroscience or Aviation/Aerospace Fundamentals<br>Filmstrip: Don't Build that Rocket Alone - NASA<br>Rocket kit - Estes Industries |

WORK COPY

UNIT TITLE: Introduction to Power Plants

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Pulsejet<br>Ramjet<br>Turbojet<br>Turbofan<br>Wankel Engine | Read references.<br>Study diagrams and pictures.<br>Write reports on each different type of reaction engine listed.<br>Study diagram and model. | Teacher evaluation of reports.<br><br>Discuss possible use relating to times. | Book: Exploring in Aerospace Rocketry<br><br>Cut-away engine - hobby shop |
| Turboprop<br>Turboshaft | Study diagram or transparencies for operation.<br>Read references for power application. | Oral questions | Diagrams or teacher - constructed transparencies<br>References:<br>Aeroscience<br>Above and Beyond |

13 - 10-II-17 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE 13.0499

TEACHING UNIT NO. II - 17

TEACHING UNIT TITLE: Flight Computer Functions

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. make decisions involving flight computations efficiently by using the computer.
2. use the wind side of the computer in planning a cross-country flight and solving the problems involved.
3. work wind problems using a wind triangle and the computer. Compare the two methods orally or in writing.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 10 (1 hour per day)

EVALUATION:
1. Teacher evaluation of sample problems.
2. Teacher-student evaluation of cross-country flight problems-written and oral.
3. Student evaluation of student's oral explanation.

TEACHER COMPETENCY: Ability to use slide rule and computer efficiently.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Flight Computer Section C - Sanderson
Transparency - Flight Computer: Wind Side - Sanderson

Books: - Aviation/Aerospace Fundamentals
General Aeronautics

Equipment: - Sectionals
Computers

GENERAL COMMENT: The flight computer aids the pilot in making all computations necessary for a successful flight. Thus a basic understanding of the wind side of the computer is invaluable to the pilot.

WORK COPY

UNIT TITLE: Flight Computer Functions

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. use the wind side of the computer to solve navigation problems with 80% efficiency.
2. illustrate the effect of wind on aircraft navigation and how to correct for these winds by using the computer.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Flight computer: wind side | After reviewing text and observing instructor's overhead projector demonstration, work a problem using the wind triangle. Work identical problem with computer. Compare flight computer with mathematical wind vector. State observations orally. Work sample problems. | Check results of mathematical wind vector and computer problem solving. | Text: Aviation/Aerospace Fundamentals chap. 8-12 - 8-17; 8-24; 8-26.<br><br>Filmstrip: Sanderson's Flight Computer Part C |
| Wind side components:<br>Sliding grid<br>Azimuth<br>True index<br>Grommet | View filmstrip. Flight Computer Part C<br><br>Follow on your individual computer as the teacher points out and explains the components of the computer. | Oral or written test on location and uses of components on wind side of computer | Classroom size computer or transparency<br><br>Individual computers |

WORK COPY

UNIT TITLE: Flight Computer Functions

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Ground speed<br>True course<br>True heading<br>Wind correction angle | Read text.<br><br>Observe teacher and overhead projector or classroom computer demonstration showing how to determine ground speed, true heading, and wind correction angle with wind side of computer.<br><br>Work sample problems.<br><br>Plot a 3-leg cross-country flight to points designated by the teacher. Using data given by the teacher, work all problems using the wind side of the computer.<br><br>Explain to other students how to solve problems on the wind side of the computer. | Evaluate cross-country problems.<br><br>Post test. | Aviation/Aerospace Fundamentals<br>or<br>General Aeronautics<br><br>Transparencies from Sanderson, "Flight Computer" 7136<br>or<br>Classroom size computer<br><br>Sectional and computer for each student. |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE: 13.0499

TEACHING UNIT NO. II - 18

TEACHING UNIT TITLE: Basic Navigation

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. read and speak basic vocabulary of navigation.
2. use tools and materials used in navigation.
3. use radio as method of navigation.
4. demonstrate principles of basic navigation by planning a simulated cross country using sectional charts.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours (1 hour per day)

EVALUATION: (1) Teacher evaluation, (2) student-teacher evaluation, (3) post test.

TEACHER COMPETENCY: Understanding of scientific principles of navigation.

INSTRUCTIONAL MATERIALS:

Visuals:
- FAA FA-02-70 "Area Navigation"
FAA FA-902 "Basic Radio Procedures for Pilots"
FAA FA-104 "This is Vortac"

Books:
- C. N. Van Deventers General Aeronautics
APR, Inc. Aeroscience
Sanderson Aviation/Aerospace Fundamentals

Equipment:
- Globe
Art paper
Printed visual flight logs
Ruler
Protractor
Computer
Symbol Flash Cards
Aircraft radio (if possible)

Consumables:
- Sectional maps, world air charts, world variation map, radio navigational charts.

GENERAL COMMENT: This unit is designed to give the student a working knowledge of basic navigation.

WORK COPY

UNIT TITLE: Basic Navigation

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. read and speak vocabulary of navigation.
2. use tools and materials used in navigation.
3. use radio as method of navigation.
4. demonstrate principles of basic navigation by planning a simulated cross country using sectional charts.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Mechanics of Navigation:<br>Develop an adequate reading and speaking vocabulary of navigation.<br><br>Introduction of most commonly used methods of navigation.<br>Pilotage<br>Dead reckoning<br>Radio<br>Celestial<br>Inertial<br><br>Interpret charts and symbols.<br><br>Concept of time in navigation.<br><br>Radio Navigation<br>Develop use of radio in navigation.<br><br>Basic radio navigation principles | Using sectional chart and ruler, draw straight line between two airports. Name various features encountered in flying between these two airports<br><br>Simulate cross-country flight from standpoint of pilotage on sectional chart. Outline steps used. Use flight log and flight plan.<br><br>Visit FAA radio facility.<br><br>On flight in aircraft, observe Vor, DME, A.D.F. and other radio navigation aids. | Have students do simple navigation problem.<br><br>Assign problems applied to simple navigation problem - time - distance-speed.<br><br>Evaluate<br><br>Student explanation of flight using radio navigation.<br><br>Post test of unit. | Globe<br>Art paper<br>Printed visual flight log<br>Ruler<br>Plotter<br>Protractor<br>Computer<br>Symbol flash cards<br>Aircraft radio (if possible)<br>Sectional maps<br>World air charts<br>World variation map<br>Radio navigational charts<br>Controller's radio charts<br><br>Films:<br>FAA FA-02-70 (25 min.) "Area Navigation"<br>FAA FA-902 (30 min.) "Basic Radio Procedures for Pilots'<br>FAA FA-104 (15 min.) "This is Vortac"<br><br>Text: C. N. De Venters General Aeronautics<br>APR, Inc. Aeroscience<br>Sanderson Aviation/Aerospace Fundamentals |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II OE CODE 13.0499

TEACHING UNIT NO. II - 19

TEACHING UNIT TITLE: Aeronautical Communications

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. show knowledge of use of radio facilities by demonstrating the use of radio communication.
2. use with 100% efficiency the phonetic alphabet and the 24 hour clock.
3. define in writing the L/MF, VHF, and UHF bands and frequencies.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 5 hours (1 hour per day)

EVALUATION: (1) teacher evaluation, (2) teacher-student evaluation (3) post test.

TEACHER COMPETENCY: Basic knowledge of radio communications.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Radio Communications - Sanderson
Air Traffic Control and Communications - Sanderson
Film - AAAARK - Something about communications

Books: - Airman's Information Manual, Aeroscience Aviation/Aerospace Fundamentals

Equipment: - Radio receiver to pick up FAA communications facilities.

GENERAL COMMENT: Students must be made aware of the facilities available to help them in planning and executing flights. Also the student should be aware of agencies available to help him in emergencies. This unit provides this basic knowledge.

WORK COPY

UNIT TITLE: Aeronautical Communications

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. show knowledge of the use of radio facilities by demonstrating the use of radio communications in a given situation.
2. recite 100% of the phonetic alphabet and tell time with 100% efficiency, using the 24 hour clock.
3. define in writing the L/MF, HF and VHF and UHF bands and their frequencies with 90% efficiency.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Basic communications:<br>Phonetic alphabet<br>24 hour clock<br><br>Greenwich mean time | Memorize the phonetic alphabet: take part in a "Spelling Bee" type recitation of the alphabet.<br>Review with teacher the 24 hour clock. Write the school bell schedule using the 24 hour clock. Write your daily schedule in Zulu time<br>View Filmstrip Radio Communications | Short written test on alphabet and 24 hour clock | |
| Frequency bands and utilization<br>L/MF bands | Read text.<br>Explain orally the limitations of the L/MF ranges | Teacher-Student evaluation of oral explanation. | Radio Communications - Sanderson<br>Aeroscience pp.373 - 376<br>Aviation/Aerospace Fundamental pp.10-20 to 10-27 |
| HF and VHF band | Read AIM and Text<br>Observe filmstrip Air Traffic Control and Communications | | Airman's Information Manual<br>Aeroscience pp. 369 - 373<br><br>Air Traffic Control and Communications |
| UHF bands | Listen to teacher explanation of military use of UHF | | |
| | | Unit Test | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aviation Science II

TEACHING UNIT NO. II - 20

TEACHING UNIT TITLE: High Speed Aerodynamics

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. describe three types of high speed flight, by listing speed range to each.
2. relate phenomena of the sound and heat barriers.
3. state ecological aspects of high speed flight.

RECOMMENDED PREREQUISITES: Aviation Science I. Aviation Science II is a semester course serving as a prerequisite for Occupational Aerospace.

TEACHING UNIT LENGTH: 10 hours (1 hour per day)

EVALUATION: (1) Pre-test (2) Post-test (3) Student-teacher evaluation

TEACHER COMPETENCY: Have a wealth of resources related to high speed aerodynamics.

INSTRUCTIONAL MATERIALS:

Visuals: Slides - The Dawning Space Age - C.A.P.

Films - Research Project X-15 - NASA; The Aircraft Called Seventy - Air Force; High Speed Flight (3); (2) Transonic, (3) Supersonic - Shell Oil Co.; air foils

Book: - Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to aid the student in understanding all aspects of high speed flight.

WORK COPY

UNIT TITLE: High Speed Aerodynamics

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. describe three types of high speed flight by listing speed range of each.
2. relate phenomena of the sound and heat barriers.
3. state ecological aspects of high speed flight.
4. illustrate various air foils associated with high speed flight by comparing them to air foils in ordinary flight.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Subsonic Flight<br>Transonic flight<br>Supersonic flight | View slides - The Dawning Space Age.<br>View films: High Speed Flight: (1) Subsonic (2) Transonic (3) Supersonic | | Slides: The Dawning Space Age - C.A.P.<br>Films: High Speed Flight:<br>(1) Subsonic<br>(2) Transonic<br>(3) Supersonic |
| Sound Barrier | Listen as the teacher describes the sound barrier and how it effects high speed flight.<br>Experiment with a starters gun and stop watch to illustrate speed of sound. | | |
| Airfoils for high speed flight | Compare airfoils for high speed flight to airfoils used for normal flight. | Have students sketch and describe four supersonic airfoil sections. | Airfoils - for ordinary flight and high speed flight. |
| Thermal barrier | Observe aerospace engineer invited by teacher to lecture and demonstrate models.<br>Use LAP No. 20<br>Read pp. 492 - 502 | | |

WORK COPY

UNIT TITLE: High Speed Aerodynamics

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| | View film: Research Project X-15 | | Film: Research Project X-15 NASA |
| | Listen as an expert invited by the teacher explains the ecological aspects of high speed flight. | Have students list problems associated with high speed flight. | |
| | Use LAP No. 20 | | |
| | View film: The Aircraft Called Seventy | | Film: The Aircraft Called Seventy - Air Force |
| | | Written examination to conclude unit. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE: 13.0499

TEACHING UNIT NO. III - 21

TEACHING UNIT TITLE: Orientation

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. practice individual and group safety under actual trade conditions.
2. recognize and demonstrate use of correct trade language.

RECOMMENDED PREREQUISITES: Aviation Science I and II

TEACHING UNIT LENGTH: 5 hours (1 hour per day)

EVALUATION: Teacher observation - student discussion - written unit test.

TEACHER COMPETENCY: A knowledge of shop procedure and aviation language.

INSTRUCTIONAL MATERIALS:

Visuals: Film - Today for Tomorrow - FAA #FA907

Books: - Above and Beyond
Aeroscience
Aviation/Aerospace Fundamentals

GENERAL COMMENT: This unit may be used to orient students to second and third year content. Gives students an understanding of safety required in the aviation/aerospace.

WORK COPY

UNIT TITLE: Orientation

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. practice individual and group safety under actual trade conditions.
2. recognize and demonstrate use of correct trade language of aerospace industry.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Type of Course<br>Class rules and regulations.<br>Shop safety. | Read list of units offered.<br>Listen to instructor's explanation.<br>Make shop safety posters.<br>View film: Today for Tomorrow. | | Film: Today for Tomorrow - FAA - #FA 907 16mm |
| Attitudes and work habits. | Listen to resource personnel explain safety and working conditions. | | References:<br>Above and Beyond<br>Aeroscience<br>Aviation/Aerospace Fundamentals |
| Trade language. | Read references.<br>Study vocabulary of aviation - aerospace terms from a prepared list. | Match words with definitions.<br><br>Unit test | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE 13.0499

TEACHING UNIT NO. III - 22

TEACHING UNIT TITLE: Aircraft Components

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. list and locate major and minor components of aircraft using diagrams, models or selection of actual parts.
2. assemble components of aircraft in correct order by using model parts or non-flyable aircraft.

RECOMMENDED PREREQUISITES: Aviation Science I and II

TEACHING UNIT LENGTH: 12 hours (1 hour per day)

EVALUATION: Teacher evaluation of shop work. Exercise sheets for units. Unit test.

TEACHER COMPETENCY: Aircraft experience in maintenance or construction helpful.

INSTRUCTIONAL MATERIALS:

Visuals: - Aircraft structural diagrams
Aircraft parts
Transparencies

Book: - Aeroscience - Misenhimer

Equipment: - Un-flyable aircraft

Consumables: - Model materials

GENERAL COMMENT: Space for shop work is necessary for this unit. This unit gives the student knowledge of aircraft make-up and develops industry related skills.

WORK COPY

UNIT TITLE: Aircraft Components

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. list and locate major and minor components of aircraft using diagrams, models or selection of actual parts.
2. assemble components of aircraft in correct order by using model parts of non-flyable aircraft.
3. contrast components of different aircraft types by defining operations.
4. demonstrate assembly skill by displaying completed shop project.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Fixed wing aircraft components.<br>Major components. | Observe identification demonstration through use of models, diagrams, pictures, or actual aircraft components.<br>Visit experimental aircraft association meet, or any air show.<br>View transparencies. | Exercise sheets composed of numbered displays. | Diagrams - Piper Aircraft Co.<br>Pictures - All-Aircraft Co.<br>Models<br>Any available aircraft<br>Text: Aeroscience<br><br>Transparencies. |
| Aircraft assembly. | Build large scale glider model from selected plans.<br>Read assigned references. | Observe flight characteristics. | Model kit of large scale glider or aircraft.<br>Aircraft Modeler |
| Aircraft disassembly. | Take apart non-flyable aircraft - identify and label all parts. | Teacher evaluation of shop work. | Old un-flyable aircraft |
| Rotary wing components -<br>Helicopter<br>Gyrocopter | Observe operation of helicopter by National Guard or Air Force unit.<br>Read references. | Class comparison of observations.<br><br>Unit test. | Helicopter visit to school<br>Text: Aeroscience |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE 13.0499

TEACHING UNIT NO. III - 23

TEACHING UNIT TITLE: Aircraft Construction Materials

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. list materials used in small aircraft construction.
2. state component parts for which each material is used.
3. identify materials from cut-away section of actual aircraft.

RECOMMENDED PREREQUISITES: Aviation Science 1 and 2

TEACHING UNIT LENGTH: 12 hours (1 hour per day)

EVALUATION: (1) student evaluation.
(2) teacher evaluation.
(3) post test.

TEACHER COMPETENCY: Basic knowledge of aircraft construction and materials used.

INSTRUCTIONAL MATERIALS:

Visuals: Film _ The Wind is Right - FAA

Books: - Aeroscience
FAA Manual 17

Consumables: _ Aircraft wood and metals

GENERAL COMMENT: This unit is designed to acquaint the student with the various materials and their uses in aircraft construction.

WORK COPY

UNIT TITLE: Aircraft Construction Materials

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objectives) Upon completion of this unit, the student will be able to:

1. list materials used in small aircraft construction.
2. state component part for which each material is used.
3. identify materials from cut-away section of a real aircraft.
4. demonstrate skill using materials by completing shop project.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Aircraft Woods:<br>Spruce<br>Fir<br>Hemlock<br>Pine (white)<br>Cedar (white)<br>Poplar (yellow)<br>Mahogany | Compare strength using charts. | Written exercise. | FAA 4313-1 Aircraft Wood Structures. |
| Wood Joints:<br>Butt<br>Scarf | Construct example of each joint using aircraft material. | Teacher evaluation of projects. | Text: Aeroscience - Misenhimer<br>FAA Manuals |
| Glues and Fasteners. | Observe demonstration by resource personnel. | | |
| Aircraft Construction. | Observe demonstration of aircraft tubing welding. | | Resource personnel<br>FAA members of aviation mechanic. |
| Metals:<br>Pure<br>Alloys | | | |
| Plastics and New Materials | Read references | Unit test or shop project. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE: 13.0499

TEACHING UNIT NO. III - 24

TEACHING UNIT TITLE: Aircraft Structures

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. show basic knowledge of aircraft construction by building sample or examples of: fuselage section, ribs, controls, and landing gears.
2. identify on slide all major aircraft structures.
3. demonstrate stress, fatigue and load in classroom experiments.

RECOMMENDED PREREQUISITES: Aviation Science I and II.

TEACHING UNIT LENGTH: 20 hours (1 hour per day)

EVALUATION: (1) Teacher evaluation, (2) Teacher-student evaluation, (3) Post test.

TEACHER COMPETENCY: Knowledge of methods of construction used in aircraft and familiarity of materials involved.

INSTRUCTIONAL MATERIALS:

Visuals: Films - The Wind is Right - FAA
Transport Crash Safety Tests - Parts I and II FAA

Books: - Aeroscience
EAA - How To: series of books.

Equipment: - Camera, phased out landing gear, various types of shock obsorbers, object showing fatigue cracks.

Consumables: - Film, aircraft wood, materials to construct mock-up of controls, sample sections of fuselage, and ribs.

GENERAL COMMENT: In aircraft, construction, one must always achieve maximum strength with minimum weight. To understand how designers do this, and to aid one in understanding preventative maintenance, a basic knowledge of aircraft construction is the goal of this unit.

WORK COPY

UNIT TITLE: Aircraft Structures

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. identify by pointing out on slides all major aircraft structures.
2. show basic knowledge of aircraft construction by constructing: sample section of a fuselage; a rib of a wing; a mock-up of a landing gear; a mock-up controls - or mock-up controls on an aircraft, with 80% proficiency.
3. demonstrate stress, fatigue, and load through use of simple classroom experiments and load tests.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Aircraft structures:<br>Wings<br>Landing gear<br>Fuselage<br>Controls | Read references.<br>Make slides, close-ups of aircraft parts.<br>Use slides in identification of structures. | | Aeroscience - pp 38 - 39<br>EAA - How To: series<br>Slides made by students<br>camera, film<br>projector, screen |
| Fuselage construction types<br>Truss<br>Semi-monocoque | Observe types of fuselage construction.<br>Listen to instructor's explanation of method of construction of types.<br>Using actual aircraft materials, or mock materials, construct sample section of each type of fuselage. | Teacher-student evaluation of construction samples of fuselage types. | Aircraft materials to construct fuselage samples on mock materials for constructing fuselage. |
| Wings:<br>Component parts:<br>Spars<br>Ribs<br>Coverings<br>Arrangement:<br>Cantilevered<br>Externally braced<br>Biplane<br>Triplane | Read references.<br>While looking at a cut-away of an actual wing, listen to the teacher's instruction concerning wings, wing parts, and wing construction. | | Aeroscience -pp 40-47<br>EAA - How To: series<br>Cut-away wing |

WORK COPY

UNIT TITLE: Aircraft Structures

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Classification:<br>Low wing<br>Mid-wing<br>High wing<br>Parasol wing<br>Gull wing<br>Inverted gull wing | Observe diagrams and pictures of, and identify from the pictures, the various wing types. | | Pictures of wing types. Diagrams put out by aircraft companies. |
| Plan Forms:<br>Tapered leading edge<br>Tapered trailing edge<br>Double tapered<br>Elliptical<br>Rectangular | Draw diagrams of each of of the plan forms. | Teacher evaluation of diagrams. | Drawings of wing plan forms. |
| Stability elements:<br>Dihedral<br>Sweepback<br>Taper | Construct at least 1 rib of a wing, using aircraft wood (1 rib per student) | Teacher-student evaluation of individual rib construction. | Aircraft wood, and equipment needed for construction of a rib. |
| Landing gear:<br>Conventional tricycle<br>Fixed retractable<br>Skis<br>Floats | Read references.<br>Study pictures of types of landing gears.<br>Observe actual landing gear and listen to teacher's instruction concerning the gear.<br>Learn nomenclature of landing gear. | Written test on nomenclature. | Aeroscience - pp.50-53<br>EAA - How To: series<br>Old landing gear. |

WORK COPY

UNIT TITLE: Aircraft Structures

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Shock absorbers:<br>Hydraulic and pneumatic<br>Rubber, disc or cord<br>steel, spring or coil | Observe various shocks. Explain to another student how the various types of shock absorbers function. | Student evaluation of explanation. | Examples of various types of shock absorbers. Phased out Air Force mock-up of gear. |
| Controls:<br>Nomenclature<br>Linkage and cables | Read references.<br>Observe film: The Wind is Right<br>Under instructor's guidance, study diagrams showing controls cables, and linkage. | | Aeroscience<br>EAA - How To: series<br>Film: The Wind is Right - FAA<br>Diagrams put out by various aircraft companies. |
| | Draw diagrams of basic control hook-ups. | Evaluation of diagrams by teacher. | |
| | Dismantle controls on old aircraft. | | |
| | Hook up controls on actual aircraft or construct mock-up of controls. | Teacher-student evaluation of control hook-up. | Discarded aircraft<br>Materials to build mock-up of controls. |
| Stress:<br>Tension<br>Bending<br>Compression<br>Shear<br>Torsion | Read references.<br>Observe film: Transport Crash Safety Test - Parts I and II. | | Aeroscience - pp 54 - 57<br>FAA - How To: series<br>Film: Transport Crash Safety Test - Parts I and II. |
| | Demonstrate each type of stress, using basic materials (i.e. torsion: wring a wash cloth) | Teacher-student evaluation of demonstrations. | Materials for stress demonstration. |

WORK COPY

UNIT TITLE: Aircraft Structures

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Fatigue:<br>Fatigue resistance<br>Endurance limit<br>Local stress concentration<br>Stop drilling | Read references.<br>Demonstrate fatigue by bending wire until it breaks.<br>Examine fatigue cracks in objects such as car bumpers, aircraft surfaces etc.<br>Observe instructor's demonstration of stop drilling. | | Aeroscience: pp 54-57<br>EAA - How To: series<br><br>Objects showing fatigue cracks. |
| Load:<br>Basic load<br>Maximum applied load<br>Ultimate load<br>Applied load factor<br>Safety factor | Read references.<br><br>Do load tests under supervision of instructor. | Post test | Aeroscience: pp 54-57<br>EAA - How To: series |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupation Aerospace Ed. II OE CODE: 13.0499

TEACHING UNIT NO. III - 25

TEACHING UNIT TITLE: Power Plants

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. recognize the types of aircraft reciprocating engines.
2. identify the various parts of a reciprocating engine by dismantling and remounting an engine.
3. demonstrate skills related to actual industry occupations.

RECOMMENDED PREREQUISITES: Aviation Science I and II.

TEACHING UNIT LENGTH: 20 hours (1 hour per day)

EVALUATION: (1) Pre-test, (2) post-test, (3) student-teacher evaluation.

TEACHER COMPETENCY: A working knowledge of and resource materials for teaching aircraft power plants.

INSTRUCTIONAL MATERIALS:

Visuals: Film - Do's and Don'ts - Teledyne Continental Motors
Turboprop/turboshaft Engines - U. S. Navy
Filmstrip - Aircraft Ignition Systems - Sanderson
Chart - Continental Aircraft Engine - Teledyne Continental Motors

Book: - Aeroscience - Misenhimer

GENERAL COMMENT: Upon completion of this unit, the student will be able to understand reciprocating and reaction engines.

WORK COPY

UNIT TITLE: Power Plants

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. recognize the types of aircraft and reciprocating engines.
2. identify the various parts of a reciprocating engine by dismantling and remounting an engine.
3. describe the types and utilizations of reaction engines.
4. demonstrate skills related to actual industry occupations.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Types of aircraft. | Read pp. 58-60 | | Text: Aeroscience - Misenhimer |
| Reciprocating engines: | | | |
| Radial | View pictures of the | Evaluate identifying of | Pictures of the different |
| Opposed | different types of engines | reciprocating engines. | reciprocating engines. |
| Obsolescent | and identify each. | | |
| Rotary | | | |
| In-line | View: Continental Air- | | Continental Aircraft Engine |
| V-type | craft Engine Brochure | | Brochure |
| Double-V | | | |
| | View: Do's and Don'ts | | Film: Do's and Don'ts Teledyne Continental Motors |
| Nomenclature | | | |
| Cylinder | Read pp. 63-67 | | |
| Piston | | | |
| Connecting rod | Dismantle and remount an | | A reciprocating engine |
| Crankshaft | engine. | | |
| Camshaft | | | |
| Crankcase | Use LAP No. 25 | | |
| Valves | | | |
| Engine systems: | Read pp. 67-78 | | |
| Lubrication | Construct mock-up of the | Evaluate mock-ups | |
| Carburetion | various systems. | | |
| Induction | | | |
| Ignition | Use LAP No. 25 | | |
| Electrical | | | |
| Exhaust | View: Aircraft Ignition | | Filmstrip: Aircraft Ignition |
| Cooling | System | | Systems - Sanderson |
| Fuel | | | |

WORK COPY

UNIT TITLE: Power Plants

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Fundamentals of engine design:<br>Power Plant<br>Horsepower<br>Super charger<br>Reliable<br>Compact<br>Low fuel and oil consumption<br>Smooth operation<br>Readily accessible | Read pp. 79-82<br><br>Listen as a guest lectures on the fundamentals of engine design. | | |
| Reaction engines:<br>Types<br>Nomenclature<br>Utilization | Read pp. 93-107<br><br>Identify pictures of reaction engines.<br><br>View: Turboprop/turboshaft Engines<br><br>Listen as teacher describes the uses of reaction type engines. | Identification of reaction engines.<br><br>Written examination to conclude unit. | Film: Turboprop/turboshaft Engines - NM-88127 - Navy |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE: 13.0499

TEACHING UNIT NO. III - 26

TEACHING UNIT TITLE: Advanced Aerodynamics

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. describe aircraft stability, how an aircraft flies.
2. relate different aircraft performances to aircraft design.

RECOMMENDED PREREQUISITES: Aviation Science I and II.

TEACHING UNIT LENGTH: 20 hours (1 hour per day)

EVALUATION: (1) Pre-test, (2) student-teacher evaluation, (3) post-test.

TEACHER COMPETENCY: Working knowledge of applied physics.

INSTRUCTIONAL MATERIALS:

Visuals: - AFTF1-160 Aerodynamics - Air Flow
AFTF1-161 Aerodynamics - Forces Acting on an Air Foil
FAA FA-704 Stable and Safe
AFTF1-5340 Part 1 High Speed Flight - Approaching the Speed of Sound
AFTF1-5341 Part 2 High Speed Flight - Transonic
AFTF5550 Part 3 High Speed Flight - Beyond the Speed of Sound

Filmstrip - Sanderson #0197 Airplane Performance

Books: - APR, Inc. Aeroscience
Sanderson Aviation/Aerospace Fundamentals
C. N. Van Deventer General Aeronautics
C.A.P. Aircraft in Flight

Equipment: - Ball, cardboard, gliders, model airplane owner's and operator's manual.

Consumables: - Performance charts, photos of aircraft.

GENERAL COMMENT: Upon completion of this unit, student will have an understanding of flight problems of modern aircraft.

WORK COPY

UNIT TITLE: Advanced Aerodynamics

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. describe aircraft stability, how the airplane flies.
2. relate different aircraft performances to aircraft design.
3. demonstrate through experiments various stability effects.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Develop nomenclature of aerodynamics. | Refer to text. | Build models of air foils and label each part. | Texts: APR, Inc. Aeroscience Sanderson Aviation/Aerospace Fundamentals C. N. Van Deventer General Aeronautics C.A.P. Aircraft in Flight |
| Aircraft stability.<br>Positive<br>Negative<br>Neutral | Demonstrate types of stability, use ball on curved cardboard. | | |
| Inherent stability.<br>Static stability.<br>Catastrophic instability.<br>Dynamic stability. | View films:<br>Aerodynamics - Air Flow<br>Aerodynamics - Forces Acting on an Airfoil | | Films: Aerodynamics - Air Flow<br>Aerodynamics - Forces Acting on an Airfoil - Air Force |
| Aircraft reference.<br>Longitudinal<br>Lateral<br>Vertical | Fly gliders and model aircraft.<br>View film: FA-704 Stable and Safe | Demonstrate on model action around axis of aircraft. | FAA FA-704 Stable and Safe |
| Longitudinal stability.<br>Lateral stability.<br>Dihedral<br>Keel effect<br>Sweepback<br>Weight distribution<br>Directional stability. | Rig models to observe stability effects. | Written exercise on definitions. | |

WORK COPY

UNIT TITLE: Advanced Aerodynamics

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Controls and auxiliary controls<br>Rudder<br>Elevator<br>Aileron | Visit airport and inspect aircraft.<br>Flight in aircraft to observe effects of controls, also torque. | | |
| Trim tabs<br>Flaps<br>Slots | | | |
| Unconventional controls and surfaces.<br>V-tail<br>Spoilers<br>Speed brakes<br>Full length flaps<br>Fences<br>Nose mounted controls | Examine photos of aircraft.<br>Read references.<br><br>Visit by aircraft designer or builder. | | Photos of different types and configuration of aircraft.<br><br>Performance charts.<br>Owner's and operator's manual of different aircraft. |
| Performance of different aircraft.<br>Review weight and balance<br>Center of gravity<br>Moment envelope<br>Take off performance Chart<br>Koch chart<br>Cruise performance Chart<br>Landing performance Chart | Use charts to observe performance of aircraft under different conditions of weights and weather.<br>View films:<br>High Speed Flight - Parts 1, 2, and 3<br>View filmstrip:<br>Airplane Performance | | Films:<br>AFTFI-5340 Part 1 High Speed Flight - Approaching Speed of Sound<br>AFTFI-5341 Part 2 High Speed Flight - Transonic<br>AFTF550 Part 3 High Speed Flight Beyond the Speed of Sound<br>Filmstrip: Sanderson #0197 Airplane Performance |
| Loads and load factors | | Written unit test. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE 13.0499

TEACHING UNIT NO. III - 27

TEACHING UNIT TITLE: Aircraft Design and Construction

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. interpret plans and specifications of aircraft components by shop projects or answering written questions.
2. create original designs for testing.
3. evaluate shop projects by applying pre-stated rules.
4. use aircraft related shop tools with acceptable skill, judged by inspection of products.

RECOMMENDED PREREQUISITES: Aviation Science I and II.

TEACHING UNIT LENGTH: 27 hours (1 hour per day)

EVALUATION: Teacher evaluation of projects
FAA inspection of any aircraft

TEACHER COMPETENCY: Working knowledge of light aircraft design and construction.

INSTRUCTIONAL MATERIALS:

Visuals: - The Wind is Right - FAA 16mm

Book: - Aeroscience
FAA Aircraft Files

Equipment: - Basic drafting equipment
Shop equipment for jig and pattern making.

Consumables: - Aircraft construction materials

GENERAL COMMENT: This unit should be taught during entire year as the students become experienced in various construction techniques. Construction of a large scale model can be substituted for actual aircraft.

WORK COPY

UNIT TITLE: Design and Construction

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. interpret plans and specifications of aircraft components by shop projects or answering written questions.
2. create original designs for testing.
3. evaluate shop projects by applying pre-stated rules.
4. use aircraft related shop tools with acceptable skill judged by inspection or products.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Working drawings<br>Basic principles<br>Lines and symbols<br>Scale and measurement | Read references.<br>Study sample plans.<br>Design and draw to scale small structural component. | Teacher guidance and evaluation of designs. | Aircraft plans and specifications.<br>Basic drafting equipment |
| Jigs and patterns | Build jig for some structural part using aircraft plans. | Teacher evaluation of shop project. | EAA Aircraft Design - Vols. 1, 2, and 3<br>Reference:<br>FAA's A.C. #43.13-1<br>A.C. #43.13-2 |
| | Make pattern of actual aircraft part. | | |
| Fuselage construction | Cut, weld, and finish fuselage section.<br>Read references.<br>Study diagrams.<br>Listen to resource person. | Teacher evaluation of shop projects.<br>FAA inspector - for experimental aircraft. | Aircraft plans<br>Aircraft tubing |
| Wing construction | Build wing from plans for aircraft or model. | FAA inspection | Aircraft wing materials<br>E.A.A. Manuals. |
| Control surfaces | Construct necessary control surfaces for aircraft or model. | Evaluation by resource personnel.<br>FAA inspection | Aircraft materials for control surfaces. |

WORK COPY

UNIT TITLE: Design and Construction

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Assembly of structural parts. | Assemble and finish structural components under direction of resource person. | Evaluation of project by instructor, resource personnel and F.A.A. inspector. | F.A.A. regulations on aircraft construction. |
| Control panel and instruments. | Construct and install control panel in aircraft or model. | Inspection by authorized personnel. | Raw materials. |
| Rigging. | Rig aircraft or model according to specifications. | Teacher evaluation. Inspector's report. | F.A.A. regulations |
| Painting. | Paint aircraft or project following directions. | Inspection by teacher, students, and resource personnel. | |
| Power plant installation. | Follow instructions and aid resource person in power plant installation. | Evaluation by inspector and engine ground test. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE: 13.0499

TEACHING UNIT NO. III - 28

TEACHING UNIT TITLE: Careers and Opportunities

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. show an awareness of the tremendous array of career and occupational opportunities in the areas of aviation and aerospace.
2. select fields of study directed toward their occupational choice.

RECOMMENDED PREREQUISITES: Aviation Science I and II.

TEACHING UNIT LENGTH: 15 hours (1 hour per day)

EVALUATION: (1) Written report on selected occupational area, (2) student-teacher evaluation.

TEACHER COMPETENCY: A working knowledge of careers and opportunities in Aviation.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrips - Careers in Aviation and Aerospace - Sanderson
Aviation - Where Career Opportunities Are Bright - FAA
Looking Ahead - Piper
Training for Perfectionists - Air Force

Film - Brother - FAA
How to Succeed Without Really Flying - FAA
It Takes A Man - Air Force
Engineer: Man of Destiny - Sterling
Aviation Mechanic - FAA
Aviation Work Shop - FAA
Holes in our Pockets - Sales Training Associates

Book: - Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to teach students about the many career opportunities in aviation. This unit can be taught as a continuous unit throughout the year.

WORK COPY

UNIT TITLE: Careers and Opportunities

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1 show an awareness of the tremendous array of career and occupational opportunities in the area of aviation and aerospace.
2 select fields of study directed toward their occupational choice.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Career planning | Read pp. 769 - 771<br>View Careers in Aviation and Aerospace | | Text: Aeroscience - Misenhimer<br>Filmstrip: Careers in Aviation and Aerospace- Sanderson |
| General Aviation Careers | Select the career you would most like in aviation.<br>Read pp. 754 - 766<br>View Aviation - Where Career Opportunities Are Bright<br>Listen to a guest lecture discuss general aviation careers.<br>View Brother<br>Visit an airport and list the jobs observed. | | Filmstrip: Aviation - Where Career Opportunities Are Bright - FAA<br>Film: Brother - FAA |
| F.A.A. careers | Read pp. 767 - 769<br>Listen to FAA personnel director explain career opportunities with the F.A.A.<br>View Aviation Workshop and How To Succeed Without Really Flying | | Films: Aviation Workshop - FAA<br>How To Succeed Without Really Flying - FAA |

WORK COPY

UNIT TITLE: Careers and Opportunities

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Armed Services Careers | Listen to guest speaker from armed services discuss career possibilities.<br>View Aviation Mechanic | | Film: Aviation Mechanic - FAA |
| Airline Careers | Read pp. 776 - 781<br>View Holes in our Pockets and Engineer - Man of Destiny<br>Discuss career Opportunities with a representative of an airline.<br>View Training for Perfectionist and Looking Ahead | Prepare a list of the career oppprtunities in the following 4 areas:<br>1. General Aviation<br>2. F.A.A.<br>3. Armed Services<br>4. Airline<br>Have students select careers they would most like in aviation and compare to their choice at beginning of unit<br>This unit can be taught as a continuous unit throughout the year. | Film: Holes in our Pockets - Sales Training Associates<br>Film: Engineer - Man of Destiny - Sterling Movies<br>Filmstrip: Training for Perfectionist - Air Force<br>Looking Ahead - Piper |
| | Undergo a job interview arranged by teacher. | | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace Ed. II

TEACHING UNIT NO. III - 29

TEACHING UNIT TITLE: Rules of Flight

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. illustrate a general knowledge of rules of flight by passing a written examination.

RECOMMENDED PREREQUISITES: Aviation Science I and II

TEACHING UNIT LENGTH: 12 hours (1 hour per day)

EVALUATION: (1) Pre-test, (2) Post-test, (3) student - teacher evaluation

TEACHER COMPETENCY: An understanding of and resource materials for teaching rules of flight.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrips - Airports - Sanderson
Airspace Utilization - Sanderson

Films: - The Flight Service Station - FAA
What's My Traffic - FAA

Book: - Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to provide the student with a general knowledge of rules of flight.

WORK COPY

UNIT TITLE: Rules of Flight

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. illustrate a general knowledge of rules of flight by passing a written examination.
2. describe the orderly movement of air traffic on the ground and in flight.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Good operating practices:<br>Alertness<br>Judgement<br>Clearing procedures | Read pp. 384-385<br>Listen as teacher discusses importance of alertness, judgement, and clearing procedures. | | Aeroscience - Misenhimer text |
| Air traffic control<br>Traffic pattern<br>Airways<br>Air navigation radio aids<br>Radar | Read pp. 385-396<br>View: Flight Service Station<br>View: Air Space Utilization<br>Listen as an invited controller discusses Air Traffic Control.<br>Attend FAA safety clinic. | | Film: The Flight Service Station - FAA<br>Filmstrip: Air Space Utilization - Sanderson |
| Airport, Air Navigation Lighting, and Marking Aids:<br>Lighting<br>Airport<br>Runway<br>Airport markings | Read pp. 397-400<br>View Airports<br>Construct a model Airport and include as many markings and lights as possible.<br>Use LAP No. 29 | Written exercise<br>Evaluate models | Filmstrip: Airports - Sanderson |
| Control Areas:<br>Departure<br>Enroute<br>Continental<br>Positive<br>Arrival | View: What's My Traffic<br>Listen as teacher describe the various control areas. | | Film: What's My Traffic - F.A.A. |

WORK COPY

UNIT TITLE: Rules of Flight

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Landing<br>Approach control<br>Tower - controlled<br>Non-tower airports | Listen as teacher compares and contrasts landings at tower - controlled and non-towered airports. | | References:<br>Airman's Information Manual |
| Emergency procedures:<br>Uncertain of position<br>Radio failure<br>Search and rescue | Listen as an invited member of the C.A.P. tells you what to do in case of an emergency. | Written examination to conclude unit. | |
| Close Flight Plan | | | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE: 13.0499

TEACHING UNIT NO. III - 30

TEACHING UNIT TITLE: Introduction to Flight Maneuvers

TEACHING UNIT OBJECTIVES: Upon completion of this unit, students will be able to:

1. list 90% of steps involved in a preflight inspection.
2. demonstrate with model plane 85% of maneuvers covered in unit while giving oral explanation of each.

RECOMMENDED PREREQUISITES: Aviation Science I and II

TEACHING UNIT LENGTH: 12 hours (1 hour per day)

EVALUATION: (1) teacher evaluation, (2) student - teacher evaluation, (3) post test

TEACHER COMPETENCY: Basic knowledge of aerodynamics and flight maneuvers

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrips: - Aircraft Ground Operation - Sanderson
Basic Flight Maneuvers - Sanderson

Film: - Flight Training Series: (1) Crosswind Approaches, Landings (2) Before You Fly (3) Take Offs, Approaches, Landings

Books: - Above and Beyond
General Aeronautics
FAA Flight Handbook

Equipment: - Model plane

GENERAL COMMENT: This unit is designed to prepare the student for an actual flying experience, during which he may pilot the plane. These maneuvers are the basic maneuvers encountered in every flight.

WORK COPY

UNIT TITLE: I[illegible]oduction to Flight Maneuvers

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. list on paper 90% of the steps involved in preflighting an aircraft.
2. relate orally an example of a typical roll out, run up, etc. with 80% of the usual procedures included.
3. demonstrate with a model a take off, climb out, basic flight maneuvers, approach, and landing, while giving oral explanation of each step, including 85% of maneuvers covered in this unit.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Preflight<br><br>Taxiing<br><br>Take offs - climb out<br><br>Basic flight maneuvers:<br>Straight and level flight<br>Medium turn<br>Climbing turns<br>Descents and gliding turns<br>Slow flight | Read references<br>Review elements involved in preflight inspection.<br>Observe demonstration of preflight inspection.<br>See film: Flight Training-Take-offs, Approaches, Landings<br>View filmstrip: Aircraft Ground Operation<br>Answer questions about filmstrip - orally<br>Observe film: Before You Fly<br>Read references given at beginning of unit.<br>Listen to flight instructor discuss proper execution of flight maneuvers.<br>Watch filmstrip: Basic Flight Maneuvers<br>Answer written questions on filmstrip.<br>On a field trip to airport, observe flight | Teacher evaluation of oral questions. | Above and Beyond Air<br>Encyclopedia of Aerospace and Aviation<br>General Aeronautics<br>FAA Flight Handbook<br>Film: Flight Training - Take-offs, Approaches, Landings<br>Filmstrip: Aircraft Ground Operation - Sanderson<br>Film: Before You Fly - Navy<br>Filmstrip: Basic Flight Maneuvers - Sanderson |

WORK COPY

UNIT TITLE: Introduction to Flight Maneuvers

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| | maneuvers as an instructor on the ground commentates. | | |
| Approach and landing | Using a model, duplicate the instructor's flight and give commentary on your demonstration. | | Model plane |
| | See film: Crosswind Approaches, Landings, and Take-offs | | Navy film: Flight Training Crosswind Approaches, Landings, and Take-offs |
| | Take a "flight" in a simulator - discuss this experience with the class. | Student - teacher evaluation of simulater flight | Simulator |
| | | Post test | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace II OE CODE: 13.0499

TEACHING UNIT NO. III - 31

TEACHING UNIT TITLE: Man in Space

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. recite facts pertaining to the early history of space flight.
2. describe how a body can be placed into space by referring to thrust, guidance systems, launching, and escape velocity.
3. summarize what lies ahead for space travel.

RECOMMENDED PREREQUISITES: Aviation Science I and II

TEACHING UNIT LENGTH: 25 hours (1 hour per day)

EVALUATION: (1) Pre - test, (2) Post - test, (3) student - teacher evaluation

TEACHER COMPETENCY: A knowledge of and resource for teaching about man in space.

INSTRUCTIONAL MATERIALS:

Visuals: Films: - Universe
The Mastery of Space
America in Space: The First Decade
Before Saturn
Friendship 7
Space Navigation
The Vital Link
Living in Space: Parts I and II
International Cooperation in Space
Ariel - The First International Satellite
By - Products of Space Research

Book: - Aerosciencc

GENERAL COMMENT: This unit is designed to allow the student to explore what man has accomplished in his quest of space.

WORK COPY

UNIT TITLE: Man in Space

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. recite facts pertaining to the early history of space flight.
2. describe how a body can be placed into space by referring to thrust, guidance systems, launching and escape velocity.
3. demonstrate international cooperation in space and state examples.
4. summarize what lies ahead for space travel through research of predictions.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Early history of space flight<br><br>Solar system:<br>Sun<br>Planets<br><br>Earth:<br>Size<br>Shape<br>Position<br>Moon | Take a pre-test to find out how much you know about space flight. View films - America in Space: The First Decade Before Saturn<br>Friendship 7<br>The Mystery of Space<br>Read pp. 526-541<br>Use LAP No. 31<br><br>Construct simulator of universe.<br>View film: Universe<br>Listen as teacher relates facts about the Earth. | Pre-test<br><br>Assign written reports related to history of man in space.<br>Evaluate structures. | Text: Aeroscience - Misenhimer<br><br>Films: America in Space<br>The First Decade Before Saturn<br>Friendship 7<br>The Mystery of Space - NASA<br><br>Film: Universe - NASA |
| Thrust required for space flight. | Visit planatarium.<br>Construct and launch rocket.<br>Use LAP No. 31<br>Read pp. 542-549 | Have students compare solid and liquid propellants. | |
| Guidance systems for space flight | View The Vital Link<br>Read pp. 550-552<br>Construct mock-up of guidance system.<br>Use LAP No. 31 | Evaluate structures. | Film: The Vital Link - NASA |

WORK COPY

UNIT TITLE: Man in Space

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Launching a satellite into orbit | Observe as NASA exhibit is displayed by expert invited by teacher.<br>Read pp. 554-556 | Written exercise | |
| Escape velocity | Listen as teacher explains escape velocity.<br>Read pp. 556-557 | | |
| Unmanned satellites and sounding rockets | Read pp. 558-566<br>Compare different satellites and rockets.<br>Construct models of various satellites and rockets.<br>Use LAP No. 31 | Evaluate structures. | |
| International cooperation in space | View Ariel - The First International Satellite and International Cooperation in Space<br>Discuss how different nations have cooperated in placing man in space. | | Films: Ariel - The First International Satellite<br>International Cooperation in Space - NASA |
| | View Space Navigation<br>Construct mock-up of Apollo aircraft.<br>Use LAP No. 31 | Evaluate structures. | Film: Space Navigation - NASA |
| From Earth to the Moon and beyond | Simulate trip to moon and back to Earth.<br>Read pp. 556-587 | | |

WORK COPY

UNIT TITLE: Man in Space

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Three steps to the Moon | Read pp. 587 - 602 list the various steps and describe each. | | |
| Major human problems in space | View Living in Space - Parts I, II, and III<br>Read pp. 603 - 611<br>Listen as teacher explains problems of living in space and how these problems have been overcome. | | Film: Living in Space - Parts I, II, and III - NASA |
| Predict what lies ahead | View By-Products of Space Research | Have students predict the future of space exploration.<br>Written exam to conclude unit. | Film: By-Products of Space Research - NASA |

13 - 12-IV-31 - 72

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0489

TEACHING UNIT NO. IV - 31

TEACHING UNIT TITLE: F.A.A. Regulations

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. express an understanding of the F.A.A. Regulations by passing an examination related to these regulations.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II

TEACHING UNIT LENGTH: 20 hours (2 hours per day)

EVALUATION: (1) Written examination

TEACHER COMPETENCY: Knowledge of F.A.A. regulations

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrips - Private Pilot, Federal Aviation regulations and space utilization - Sanderson

Film - Flight - F.A.A.
Guide - Federal Aviation regulations: a programmed self study guide - C.A.P.

Book: - Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to help students understand the F.A.A. regulations and the necessity for enforcement.

WORK COPY

UNIT TITLE: F.A.A. Regulations

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

(1) express an understanding of the F.A.A. regulations by passing an examination related to these regulations.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| F.A.A. Regulations:<br>Part 61<br>(1) General Definitions<br>(2) Abbreviations and symbols.<br>(3) Certification - Pilots and flight instructors Part 65<br>(4) Certification - Airmen other than flight crew members. | Read: Federal Aviation Regulations: A Programmed self - study guide. Read pp. 425 - 440<br><br>View - Private Pilot Federal Aviation Regulations and Space Utilization.<br><br>Read pp. 441 - 442 | | Text - Aeroscience - Misenhimer.<br><br>Guide - Federal Aviation Regulations: a programmed self - study guide.<br><br>Filmstrips - Private Pilot Federal Aviation Regulations and Air Space Utilization (3)- Sanderson |
| Part 91<br>(1) General Operating and flight rules<br>(2) Flight rules | Read pp. 442 - 445<br><br>View - Flight | Written examination to conclude unit. | Film - Flight - F.A.A. |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE: 13.0499

TEACHING UNIT NO. IV - 32

TEACHING UNIT TITLE: Aviation Meteorology

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. express an understanding of weather hazards.
2. read and interpret teletype reports through actual flight plan.
3. read and use weather charts.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II

TEACHING UNIT LENGTH 36 hours (2 hours per day)

EVALUATION: 1. Interpretation of sequence reports.
2. Written examination.

TEACHER COMPETENCY: A knowledge of weather and weather services related to aviation.

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Advanced Meteorology - Sanderson
Meteorology from Space - NASA
Film - Space Down to Earth - NASA
Landing Weather Minimums Investigation FR878 Air Force
Key to Sequence Report - Daily weather reports.

Book: - Aeroscience - Misenhimer Aviation Weather

GENERAL COMMENT: This unit is designed to acquaint the student with aviation weather and the factors associated with weather, and give him the ability to use this knowledge effectively.

WORK COPY

UNIT TITLE: Aviation Meteorology

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. express an understanding of weather hazards.
2. read and interpret teletype reports through actual flight planning.
3. read and use weather charts.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Weather Hazards<br>Poor visibility<br>Fog<br>Haze<br>Dust<br>Precipitation<br>Icing<br>Thunderstorms<br>Turbulence<br>Extreme weather (tornados, etc.)<br>Density - Altitude | Read references.<br><br>View teacher constructed transparencies and slides.<br>View - Landing Weather Minimums Investigation.<br><br><br><br><br>View - Advanced Meteorology<br>Study key to sequence reports | <br><br><br><br><br><br><br><br><br>Written exercise on interpretation of actual sequence reports. | Reference Aviation Weather<br><br>Transparencies and slides<br>Text - Aeroscience - Misenhimer<br>Film - Landing Weather Minimums Investigation - FR878 - Air Force Filmstrip - Advanced Meteorology (3) - Sanderson<br><br><br>Key to Sequence reports. |
| Teletype reports<br>Sequence reports<br>Winds aloft<br>Terminal forecast<br>Area forecast<br>Severe weather forecast<br>Radar reports<br>Sigments<br>Airmets<br>Pilot reports | <br><br><br>Read references, Interpret actual daily forecast.<br><br><br>Man weather station.<br>View - Space Down to Earth | <br><br><br><br><br><br><br><br><br> | <br><br><br>Daily weather reports.<br><br><br><br>Weather maps and charts.<br>Film - Space Down to Earth - NASA |

WORK COPY

UNIT TITLE: Aviation Meteorology

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Weather charts<br>. Surface<br>. Depiction<br>. Radar summary<br>. 24 hour low high level prognosis charts<br>. Jet stream<br>. Constant pressure<br>. 850 and 700 millibar<br>. Winds aloft<br>. Satellite | View - Meteorology From Space | | Filmstrip - Meteorology From Space - NASA<br><br>Film: |
| High Altitude Weather<br><br>Arctic weather<br><br>Mountain weather | Read references | Written examination to conclude unit. | Reference:<br>Aviation Weather - Government printing office |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0499

TEACHING UNIT NO. IV - 33

TEACHING UNIT TITLE: Advanced Flight Computer

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. state the fuel consumption of an aircraft for a given distance at a known rate of speed and time of travel, using flight computer computations.
2. develop wind problems using the computer.
3. draw a wind triangle of an actual condition.
4. explain an off course condition using a sectional map.

RECOMMENDED PREREQUISITES: Aviation Science I and II.
Occupational Aerospace II.

TEACHING UNIT LENGTH: 10 hours (2 hours per day)

EVALUATION: (1) Pre - test, (2) Teacher observation, (3) Post unit test.

TEACHER COMPETENCY: Working knowledge of computer functions.

INSTRUCTIONAL MATERIALS:

| | | |
|---|---|---|
| Visuals: | Filmstrip | - Computer 2 - Sanderson |
| | Transparency | - Flight Computer - Sanderson |
| Book: | | - Aeroscience - Misenhimer |
| Equipment: | | - E6 - B type computer - Aircraft plotter |

GENERAL COMMENT: The flight taken should be an integral part of the unit of instruction. The trip should follow the visit of a resource person.

WORK COPY

UNIT TITLE: Advanced Flight Computer

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. state the fuel consumption of an aircraft for a given distance at a known rate of speed and time of travel using flight computer computation.
2. develop wind problem using the computer.
3. draw a wind triangle of an actual condition.
4. explain an off course condition using a sectional map.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Review of computations - calculator side of the computer, time, speed and distance, fuel comsumption. | Observe sample problem - solve sample problem using computer. | Pre - test | E 6 - B Type Computer<br>Aircraft plotter |
| Conversion - airspeed to true airspeed - calibrated altitude to true altitude - statute to nautical miles - fahrenheit to centigrade temperature. | View filmstrip Computer 2 | Teacher observation | Filmstrip: Computer 2<br>Sanderson |
| Effect of wind - course heading and drift angle - wind triangle - technique in use of plotter. | Solve real problem from plans that have been filed and have contest among students for accuracy. | Observation of student in actual flight conditions | Book - Aeroscience - Misenhimer<br><br>Transparency-<br>Flight - Computer 2<br>Sanderson |
| Wind side of computer - true index - grommet<br>a. wind triangle using E6-B computer<br>b. enroute wind triangle using E6 - B computer | Prepare a pilot planning chart for flight and draw wind triangle.<br><br>Chart an actual flight. | Post unit test | |

WORK COPY

UNIT TITLE: Advanced Flight Computer

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Off course and Radius of action problems. | and follow through.<br><br>Listen as resourse person discusses computer use in flight.<br><br>Study transparency flight computer. | | |

113

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0499

TEACHING UNIT NO. IV - 34

TEACHING UNIT TITLE: Radio Aids and Communications

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. list current communication aids used by light aircraft.
2. demonstrate a working knowledge of light aircraft facilities by using those necessary for actual flight, from a controlled airport.

RECOMMENDED PREREQUISITES: Aviation Science I and II
Occupational Aerospace II

TEACHING UNIT LENGTH: 20 hours (2 hours per day)

EVALUATION: Instructor Evaluation.
Weekly written exercise.
Written unit test.

TEACHER COMPETENCY: A working knowledge of aviation communications and devices.

INSTRUCTIONAL MATERIALS:

Visuals: - 16mm Film #HQA - 174 The Vital Link N.A.S.A.
16mm Film #FAC - 122 Using The Airspace F.A.A.
16mm Film #TE6132 - Avionic Maintenance Safety U.S.A.F.

Book: - Aeroscience, Aviation/Aerospace Fundamentals

GENERAL COMMENT: Relate communication equipment studied to those used in actual flight by students.

WORK COPY

UNIT TITLE: Radio Aids and Communication

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. list current communication aids used by light aircraft.
2. demonstrate a working knowledge of light aircraft communication facilities by using those necessary for actual flight, from a controlled airport.
3. identify coded letters by sound or sight.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Radio aids<br>. V.O.R. Stations.<br>. A.D.F. Stations. | Visit facility related to subject.<br>Listen to F.A.A. resource person.<br>Read references. | Oral evaluation by class members. | Text Aeroscience Aviation/ Aerospace Fundamentals |
| . Distance measuring equipment. | Study diagrams and references.<br>View transparencies. | Written exercise. | Manufacturer's manuals. |
| . Instrument landing system. | View 16mm film Avionic Maintenance Safety<br>View slides. Study references. Construct mock-up. | Written test including diagrams. | 16mm film Avionic Maintenance Safety U.S.A.F.<br>Above and Beyond. |

WORK COPY

UNIT TITLE: Radio Aids and Communication

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Transponders. | Read references Aviation/Aerospace | Written identification test. | Airman's Information Manual |
| | Read references. Aviation/Aerospace Fundamentals | | Aeroscience Aviation/ Aerospace Fundamentals. |
| | Construct Avionic display using manufacturing picture. | | |
| Collision Avoidance systems. | Report to group on developments and products for avoidance systems. | | Manufacturer's description of avoidance systems. |
| Space Communications. | Listen to resource person View film The Vital Link | Class discussion. | NASA film #HQA - 174 The Vital Link |
| | | Written unit examination. | |

WORK COPY

UNIT TITLE: Radio Aids and Communications

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Radios<br>. Types<br>. Operation<br>. Interference<br>. Rules | Identify aircraft radios from photographs or units.<br><br>View film - Using the Airspace. Read references supplied by instructor. | <br><br>Written test. | Pictures of radio units or actual units FAA Film #FAC - 122 Using the Airspace |
| Radar controlled approaches | View diagrams. Listen to FAA safety talk. | Class discussion. | |
| Radio procedure<br>. Ground<br>. Air | Demonstrate proper procedure during actual flight. | Record messages play to class. | Tapes or cassettes. |
| Morse code<br>. Aural<br>. Visual | Study examples.<br><br>Listen to recordings of Morse code.<br>Identify light signals | <br><br>Using key send letters for identification. | <br><br>Recordings of Morse code. |
| Frequences | Study list supplied by teacher. | | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0499

TEACHING UNIT NO. IV - 35

TEACHING UNIT TITLE: Pre-Flight

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. pre-flight an aircraft by using a check list.

RECOMMENDED PREREQUISITES: Aviation Science I and II
Occupational Aerospace II

TEACHING UNIT LENGTH: 10 hours (2 hours per day)

EVALUATION: (1) Pre-flight different aircraft.

TEACHER COMPETENCY: A knowledge of pre-flight techniques.

INSTRUCTIONAL MATERIALS:

Visual: Film - Pre-flight and Visual Inspections - SA16 Air Force FTA 174A - B

Book: - APR. Inc. Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to enable students to perform pre-flight checks.

WORK COPY

UNIT TITLE: Pre-Flight

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

(1) Pre-flight an aircraft by using a checklist.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Exterior checks:<br>Controls<br>Landing gear<br>Propeller<br>Fuel<br>Lights<br>For signs of damage | Read pp. 408 - 410<br><br>View Pre-flight and Visual Inspections PT. 1<br><br>Observe as teacher goes over the pre-flight exterior checks. | | Text: APR, Inc. Aeroscience - Misenhimer<br><br>Films: Pre-flight and Visual Inspections - Air Force FTA 174A - B |
| Interior checks:<br>Instruments<br>Required certification<br>Check list | View Pre-flight and Visual Inspections PT. 2<br><br>Observe as teacher goes over the pre-flight interior checks.<br><br>Review check list for various aircraft. | Visit airport and have students pre-flight as many aircraft as possible.<br><br>Written examination to conclude unit. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0499

TEACHING UNIT NO. IV - 36

TEACHING UNIT TITLE: Airports and Airways

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. list and describe the various types of airports.
2. plan an airport for his area.
3. describe victor airways by referring to a sectional chart.

RECOMMENDED PREREQUISITES: Aviation Science I, II and Occupational Aerospace II

TEACHING UNIT LENGTH: 20 hours (2 hours per day)

EVALUATION: (1) Plan an airport, (2) Student-teacher evaluation, (3) Written examination.

TEACHER COMPETENCY: A working knowledge of and resource materials for teaching airports and airways.

INSTRUCTIONAL MATERIALS:

Visuals: Films - A Place to Land; It Pays to Stay Open: Dulles International Airport, Port of the Future: Airports in Perspective: Best Investment We Ever Made - FAA

Filmstrip- Airports, Airways and Electronics - C.A.P.

Book: - APR. Inc.
Aeroscience - Misenhimer

GENERAL COMMENT: This unit is designed to teach students the operations of airports and the necessity of airways.

WORK COPY

UNIT TITLE: Airports and Airways

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. list and describe the various types of airports.
2. plan an airport for his area.
3. describe victor airways by referring to a sectional chart.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Airports:<br>Types<br>Functions<br>Facilities<br>Management<br>Financing<br>Planning<br>Future needs<br>Benefits. | List and describe the various types of airports.<br>View: The Best Investment We Ever Made<br>Listen as an invited fixed base operator explains the behind-the-scenes activities on an airport.<br>View: Airports in Perspective<br>Visit an airport and observe the activities.<br>View: It Pays to Stay Open<br>Plan an airport for your area.<br>Discuss airports with an Airport manager invited by the teacher.<br>Use LAP No. 36<br>View: A Place to Land<br>Justify your airport by listing the future needs and benefits to the community.<br>View: Dulles International Airport - Port of the Future | Evaluate plans. | Film: The Best Investment We Ever Made - FAA<br>Airports in Perspective - FAA<br>It Pays to Stay Open - FAA<br>A Place to Land - FAA<br>Dulles International Airport - Port of the Future - FAA |

WORK COPY

UNIT TITLE: Airports and Airways

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Airways | Listen as an invited speaker describes Victor Airways.<br>Read Airman's Information Manual - Part 1 on airways<br>View: Airports, Airways, and Electronics.<br>Study sectional chart showing airways. | | Airman's Information Manual - Part 1<br>Airports, Airways, and Electronics - CAP<br>Sectional chart<br>Federal Aviation Regulations - Part 71 |
| Airman's Information Manual.<br>Part 1<br>Part 2<br>Part 3<br>Part 4 | Study assigned references. | Written examination to conclude unit. | Enroute low and high altitude charts. |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0499

TEACHING UNIT NO. IV - 37

TEACHING UNIT TITLE: Flight Planning

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. complete a flight plan.
2. use flight plan as instrument of safety.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II

TEACHING UNIT LENGTH: 10 hours (2 hours per day)

EVALUATION: (1) Completing a flight plan.

TEACHER COMPETENCY: A knowledge of flight planning.

INSTRUCTIONAL MATERIALS:

Visual: Film - The Flight Service Station - F.A.A.

Book: - APR, Inc.
Aeroscience - Misenhimer

Equipment: - Plotter
Computer watch

Consumables: - Flight log forms - Flight plan forms

GENERAL COMMENT: This unit is designed to teach the student to complete a flight plan.

WORK COPY

UNIT TITLE: Flight Planning

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Ojbective) Upon completion of this unit, the student will be able to:

1. complete a flight plan.
2. use flight plan as instrument of safety.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Information:<br>Weather<br>Pre-flight planning or log<br>Aircraft inspection<br>Clearances<br>Flight plan<br>Activate<br>On route reports<br>Close | Read pp. 407 - 411<br>Consult local flight service station for weather information.<br><br>View: The Flight Service Station. Fill out a flight plan.<br><br>Use LAP No. 37<br>Visit a flight service station.<br><br>Take an actual trip from your flight plan. | Have students fill out a flight plan as a post test. | Text - APR, Inc.<br>Aeroscience - Misenhimer<br><br>Film - The Flight Service Station - F.A.A. Navigation Log - maps - plotter - computer - watch - flight plan forms. |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace OE CODE 13.0499

TEACHING UNIT NO. IV - 38

TEACHING UNIT TITLE: Flight Maneuvers

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. describe in writing execution of basic flight maneuvers.
2. execute, with flight instructor's supervision, all basic airplane maneuvers.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II.

TEACHING UNIT LENGTH: 20 hours (2 hours per day)

EVALUATION: (1) Student - teacher evaluation, (2) teacher evaluation, (3) flight instructor's evaluation, (4) post test.

TEACHER COMPETENCY: Private pilot

INSTRUCTIONAL MATERIALS:

Visuals: Filmstrip - Private Pilot's Airplane Course - Sanderson Maneuvers

Book: - Private Pilot's Handbook to Aeronautical Knowledge FAA

GENERAL COMMENT: This unit provides for actual flight experience with flight instructors supervision, in which all basic flight maneuvers are covered.

WORK COPY

UNIT TITLE: Flight Maneuvers

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. describe in writing with 90% efficiency the execution of all basic airplane maneuvers.
2. while in control of aircraft under flight instructor's supervision, execute all basic airplane flight maneuvers, to the satisfaction of the flight instructor.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Preflight<br>Taxi<br>Take off<br>Climb out<br>Straight and level<br>Traffic pattern | Observe filmstrip covering the preliminary flight maneuvers. Answer questions orally.<br><br>Make a flight with certified flight instructor. Execute maneuvers.<br><br>In class have a critique concerning the individual flights. | Teacher evaluation of questions.<br><br>Flight instructor's evaluation. | Private Pilot Airplane Maneuvers Course - Sanderson |
| Medium turns<br>Climbing turns<br>Descents and Girding turns | Read reference - observe filmstrip - participate in class discussion concerning maneuvers covered in filmstrip. | | Private Pilot's Handbook of Aeronautical Knowledge - FAA<br><br>Private Pilot Airplane Maneuvers Course |
| Stalls<br>Slow flight approach and Landing | Make flight - execute maneuvers.<br><br>Have critique of flight experience. | Student - teacher evaluation. | |

WORK COPY

UNIT TITLE: Flight Maneuvers

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Speed changes in level flight | Observe filmstrip | | Private Pilot Airplane Maneuver Course - Sanderson |
| Ground reference maneuvers. | Take flight and execute maneuvers. | | |
| Coordination exercises turns to headings. | Have critique on flight maneuver execution. | | |
| Crosswind take offs and landings. | Observe filmstrip | | Private Pilot Airplane Maneuver course |
| Use of LAPs | Read reference. Answer written questions. | Teacher evaluation | Private Pilot's Handbook to Aeronautical Knowledge FAA |
| Emergency go-arounds. Forced landings. | Take flight - execute maneuvers. Have critique of flight maneuvers. | Flight instructor's evaluation. | |
| | In flight review all maneuvers previously executed. | Student - teacher evaluation. | |
| | Review filmstrips Visit EAA fly in - observe maneuvers. | Post test | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE: 13.0499

TEACHING UNIT NO. IV - 39

TEACHING UNIT TITLE: Applied Navigation

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. realize importance of navigation and communication to modern air travel.
2. utilize maps, charts, tools as used in modern navigation.
3. understand the principles and rules of cross-country flying.
4. know flight planning procedure.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II.

TEACHING UNIT LENGTH: 40 hours (2 hours per day)

EVALUATION: 1. Teacher evaluation of student's use of navigational tools -charts - maps.

2. Post test.

TEACHER COMPETENCY: Rated or private pilot or basic ground instructor.

INSTRUCTIONAL MATERIALS:

Visuals: - AF SFP 1728 The Story of Navigation/Transparencies on Navigation
TF1-3460 Aerial Navigation - Map Reading/Jeppesen & Co. Company, Denver Colorado
TF1-4990 Primary Pilot Navigation
TF1-5206 series Wind and the Navigator - Sanderson, Denver, Colorado
FAA FAC122 Using the Airspace, Navigation and Communication

Books: - APR, Inc. Aeroscience/ C.N. Van Deventer General Aeronautic Sanderson Aviation/Aerospace Fundamentals/ Civil Air Patrol Navigation

Equipment: - Ruler, plotter, computer, radio, navigation instruments, sextant, clock, air Almanac and the Weather.

Consumables: - Maps (Sectional and WAC) printed flight plan forms. Printed flight log forms celestial charts.

GENERAL COMMENT: This unit imparts knowledge to student on use of navigational tools and ability to work navigational problems.

WORK COP.

UNIT TITLE: Applied Navigation

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. realize importance of navigation and communication to modern air travel.
2. utilize maps, charts, tools as used in modern navigation.
3. understand the principles and rules of cross-country flying.
4. know flight planning procedure.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTION MATERIALS |
|---|---|---|---|
| Applied use of all forms of aerial navigation.<br>Pilotage<br>Visual landmark<br><br>Dead reckoning.<br>Maps and charts<br>Symbols<br>Scales<br>Variation<br>Computer<br>Plotter<br>Wind triangle<br>Radio<br>LF radio navigation | Refer to text.<br>Plan simulated flight between three airports at least 100 miles apart, plan course in a triangular pattern. Draw course on sectional map. With given air speed and weather conditions, plot each leg of trip, using compass correction chart as found in C.N. Van Deventer General Aeronautics pp. 302, Fig. 10 correct for deviation. Use variation as found on map given fuel consumption and cost of fuel.<br>View films:<br>The Story of Navigation<br>Using the Airspace<br>Navigation and Communications<br>Aerial - Navigation<br>Map Reading<br>Primary Pilot Navigation<br>Wind and the Navigator<br>Series 4 parts | Complete simulated problem. | Ruler<br>Plotter<br>Computer<br>Maps, sectional and WAC<br>Printed flight log forms<br>Printed flight plan forms<br>Radio (workable) instruments:<br>1. Compass<br>2. Glide slope<br>3. DME<br>4. ADF<br>Films: AF-SFP 1728, 26 min., color The Story of Navigation<br>FAA FAC22 Using the Airspace-Navigation and Communication 1966 AO and PA<br>AFTF1-3460 Aerial Navigation - Map Reading<br>TF1-4990 Primary Pilot Navigation 1955, color, 27 minutes.<br>TF1-5206 series Wind and the Navigator 4 parts<br>Transparencies on navigation-Jeppesen and Company, Denver, Colo., Sanderson, Denver, Colo.<br>Sextant, celestial charts, Air Almanacs, timer or clock. |

WORK COPY

UNIT TITLE: Applied Navigation

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Radio (continued)<br>Omni range<br>Radar<br>Ground controlled<br>Electronic equipment<br>Homer beacons - ADF and DME<br>Doppler<br>Radar (transponder, GCA) | View Transparencies on Navigation<br><br>Refer to text and reference materials. | | Text: APR, Inc. Aeroscience<br>C.N. Van Deventer General Aeronautics<br>Sanderson Aviation/Aerospace Fundamentals<br>Civil Air Patrol Navigation and the Weather |
| Celestial<br>Navigational stars<br>Sextant<br>Celestial charts<br><br>Inertial | Write reports on different types of<br><br>Study references | Written unit test. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0499

TEACHING UNIT NO. IV - 40

TEACHING UNIT TITLE: Basic Air Frame and Power Plant Maintenance and Inspection

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. perform pre-flight inspection of complete aircraft to level of licensed pilot.
2. demonstrate basic skill in air frame maintenance by participating in shop restoration project.
3. read and interpret inspection manuals, FAA's and Advisory circulars.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II.

TEACHING UNIT LENGTH: 34 hours (2 hours per day)

EVALUATION: (1) Teacher evaluation, (2) Student team "A" perform work, team "B" repeat inspection and evaluate team "A" write-up.

TEACHER COMPETENCY: General knowledge of aircraft maintenance procedures.

INSTRUCTIONAL MATERIALS:

Visuals: -Men of Maintenance - Southeast Asia - SFP 1571 Air Force
The Case of the Million Dollar Pliers - SFP 1263 USAF

Books: -FAA Advisory Circular 20 - 9 Inspection of Aircraft, and Advisory Circulars 43, 13-1, 43.13-2

Equipment: -Aircraft fuselage, wings, empennage, and/or other air frame components.
Shop tools and equipment.

Comsumables: -Cleaning materials, masking tape, paint thinner.

GENERAL COMMENT: This unit is designed to provide students with a basic knowledge of air frame and power plant maintenance and inspection.

WORK COPY

UNIT TITLE: Basic Air Frame and Power Plant Maintenance Inspection

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Corrosion Protection | Clean and refinish section of tubular fuselage. | | |
| Identification, testing and inspection of materials<br>Identification of metal<br>Testing of metals<br>Non-destructive testing<br>Identification of fabrics and plastics | Listen to resource speaker. | | |
| Aircraft Equipment:<br>Landing gear<br>Miscellaneous | Construct mock-up aircraft landing gear.<br>Draw diagram of assigned electrical systems.<br>Prepare written report on inspection and overhaul of propellers. | Evaluate project.<br>Evaluate diagrams.<br>Evaluate reports. | Mechanics manuals<br>Fixed base operators |
| Engines and Fuel Systems:<br>Engines<br>Fuel<br>Exhaust | Observe annual inspection if possible. | | |
| Instruments:<br>Maintenance<br>Inspection | Assemble and inspect engine of flight instrument. | Teacher observation.<br>Post unit test. | Manufacturers manuals |

WORK COPY

UNIT TITLE: Basic Air Frame and Power Plant Maintenance Inspection

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. perform pre-flight inspection of complete aircraft to level of licensed pilot.
2. demonstrate basic skill in air frame maintenance by participating in shop restoration project.
3. read and interpret inspection manuals, FFA's, and advisory circulars.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Aircraft Wood Structures:<br>Materials and practices<br>Finishing wood structures | Inspect damaged aircraft structures | Teacher observation. | F.A.A. Advisory Circular 4314-1 and 4313-2 throughout unit. |
| Aircraft Metal Structures<br>References<br>Welding<br>Metal repair procedure<br>Repair of laminated structures | Dismantle metal aircraft part.<br>View Men of Maintenance | | Film: Men of Maintenance - USAF |
| Fabric Covering<br>Practices and preventions<br>Doping<br>Repairs to fabric covering<br>Fabric testing | Test two separate aircraft fabrics.<br>Write report.<br>Read references.<br>View The Case of the Million Dollar Pliers | Evaluate student reports. | Film: The Case of the Million Dollar Pliers - USAF |
| Control Cables:<br>Inspection and repair<br>Safety methods | Remove and replace aircraft cables in unflyable aircraft or mock-up | Teacher evaluation of shop work. | |
| Aircraft Hardware and Use<br>Identification and use | Study references and diagrams. | Written test on fasteners. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE 13.0499

TEACHING UNIT NO. IV - 41

TEACHING UNIT TITLE: Optional Flight Training

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. summarize experiences of actual flight.
2. operate aircraft under supervision of flight instructor.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II.

TEACHING UNIT LENGTH: 40 hours (2 hours per day)

EVALUATION: Flight instructor will evaluate

TEACHER COMPETENCY: Certified flight instructor

INSTRUCTIONAL MATERIALS:

Visuals: Films - Path to Safety - FAA
The Flight Decision - National Association of State Aviation Officials

Book: - FAA Private Pilot's Handbook

GENERAL COMMENT: This unit is designed to orient the students with the sensation of flight.

WORK COPY

UNIT TITLE: Optional Flight Training

STUDENT BEHAVIORAL OBJECTIVE: (Training Unit Objective) Upon completion of this unit, the student will be able to:

1. summarize experiences of actual flight.
2. operate aircraft under supervision of flight instructor.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Dual flight instruction<br>Lesson I<br>Preflight<br>Checklist<br>Start and warming<br>Radio<br>Taxi<br>Run-up<br>Take-off<br>Climb out<br>Straight and level<br>Turns<br>Glides<br><br>Lesson II<br>Review Lesson I<br>Radio<br>Take-off<br>Turns<br>Approach to stalls<br>Stalls - power off<br>Air speed, climb, cruise, glide<br>Slow flight<br>Pattern | Listen to flight instructor.<br><br>View Path to Safety<br>View The Flight Decision | Have students relate experiences of dual flight instruction. | Film: Path to Safety - FAA<br>The Flight Decision -<br><br>National Association of State Aviation Officials<br><br>Book: FAA Private Pilot's Handbook |

WORK COPY

UNIT TITLE: Optional Flight Training

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Lesson III<br>Review I and II<br>Stalls - power on<br>Stalls - departure<br>Pattern<br>Airspeed<br><br>Lesson IV<br>Review Lesson III<br>Stalls - departure<br>S - turns<br>Instruments<br><br>Lesson V<br>Review Lesson IV<br>8's around pylons and 720's about a point<br>Instruments<br><br>Lesson IV<br>Review Lesson V<br>Touch-and-go's<br><br>Lesson VII<br>High air wor<br>Touch-and-go's | | Evaluation by flight instructor. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Aerospace Occupations III OE CODE 13.0499

TEACHING UNIT No. IV - 42

TEACHING UNIT TITLE: The Social, Political, Economic and Cultural Impact of Aerospace

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. discuss in writing the economic, social, political and cultural impact of aerospace, including 75% of all covered in class.
2. cite in writing, examples found in newspapers and periodicals concerning the effect aviation is having on the environment.
3. name orally ten or more practical benefits that are a result of aerospace research.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Aerospace Occupations II.

TEACHING UNIT LENGTH: 40 hours (2 hours per day)

EVALUATION: (1) Teacher - student evaluation, (2) teacher evaluation, (3) post test.

TEACHER COMPETENCY: Basic knowledge of social studies and basic knowledge of effect of aviation on society.

INSTRUCTIONAL MATERIALS:

Visuals: Films - Air Cargo - A Modern Marketing Tool
Return From Space
Aero-Medical Research
Benefits From Space
Spin-off Into Space
International Skies
Our Shrinking World - Jet Pilot
Earth Resources - Mission 73
Space in the 70's
Can We Have a Little Quiet, Please

Books: - General Aeronautics and Aviation/Aerospace Fundamentals

Equipment: - Timetable from International Airlines Globe

GENERAL COMMENT: The aerospace industry in its lifetime has totally revolutionized our way of life. Students contemplating an aerospace career must realize the importance of this field and the profound effect it has on people's lives.

WORK COPY

UNIT TITLE: Social, Political, Economic, and Cultural Impact of Aerospace

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. discuss in writing the economic impact of aerospace on our lives, including 75% of the topics covered in class.
2. show by use of timetables and results from personal interviews how the aerospace age has caused a social, political, economic, and cultural interdependence throughout the world.
3. cite in writing examples found in newspapers and periodicals of the effect aviation is having on the environment, particularly the ecology.
4. name orally ten or more practical benefits available to us as individuals as a result of aerospace research.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Economic Impact<br>Growth in aviation jobs<br>Training for unskilled and skilled workers.<br>Changes in production and distribution of goods due to increased air cargo:<br>Less warehousing<br>Smaller inventory<br>Wider distribution<br>Lower crate costs<br>Less theft, spoilage, loss | Discuss with class various aviation careers and training required for each.<br>See film: Air Cargo<br>Go to local stores; make list of all goods flown in.<br>Using available references have panel discussion on "Aviation Contributions to Modern Living" | Teacher-student evaluation of panel. | Film: Air Cargo - A Modern Marketing Tool - U.A. Corp.<br><br>References used throughout unit - Above and Beyond - New Horizons<br>Encyclopedia of Science and Technology - McGraw-Hill<br>Aerospace Yearbook - Spartan<br>Aviation and Space in the Modern World - Dutton<br>Aviation/Aerospace Fundamentals - Sanderson<br>General Aeronautics - American Technical Society, Periodicals, General references, FAA's Historical Fact Book, CAB Publications |
| Increase in commercial and business flying<br>Expanded role of airlines<br>Expansion of general aviation<br>Increased use of helicopters and planes for special | Have commercial pilot discuss the opportunities in business and commercial flying.<br>Have representative from GAMA speak in class.<br>List businesses that could benefit economically from owning an aircraft. | Write paper on expansion of airlines, general aviation or | |

WORK COPY

UNIT TITLE: Social, Political, Economic, and Cultural Impact of Aerospace

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| jobs such as: special construction, traffic control, agriculture, and health services. | | business flying. | |
| Medical developments as result of aerospace research.<br>Artificial heart<br>Study of emphysema<br>Sight switch<br>Miniscope, etc. | See film: Aero-Medical Research | | Aero-Medical Research - USAF |
| Aerospace manufacturing:<br>Includes research, development, fabrication, assembly, sales and operation of aviation related materials.<br>Manufacturing spin-offs airport growth and development.<br>Cost of aviation growth. | Using references, give oral report to class on any aspect of aerospace manufacturing.<br>See film: Spin-Off into Space<br>Have NASA or other suitable representative discuss manufacturing spin-offs.<br>Listen to airport official discuss airport and ground facility development.<br>Ask about cost of development. | | References given at beginning of unit.<br>Spin-Off into Space - NASA |
| Economic benefits from aviation growth to a given area. | With the class, list any economic benefits your community has received as a result of aviation. | | |

WORK COPY

UNIT TITLE: Social, Political, Economic, and Cultural Impact of Aerospace

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Miniturization. | Write report on how miniturization has revolutionized manufacturing. | Teacher evaluation. | General references. |
| Social impact:<br>Interdependence of people due to "closeness" through travel. | See film: Our Shrinking World<br>Study international airline timetables to see time required to reach distant cities of the world. | | Our Shrinking World - Jet Pilot - Encyclopedia Britannica |
| Redistribution of population.<br>Increased development of communities with adequate aviation facilities.<br>Increased use of leisure time.<br>Possibilities of relief or evacuation in emergencies.<br>Changes in daily life due to speed over distance, and availability of products. | Listen to realtor discuss trends in population movement and population trends around large aviation facilities.<br>List ways people use aircraft for personal use.<br>Listen to Red Cross person discuss relief and evacuation procedures.<br>Interview several senior citizens.<br>Write a comparison of their daily life as a youth and your daily life. Make reference to changes wrought by aviation. | Teacher evaluation - oral reports. | |

WORK COPY

UNIT TITLE: The Social, Political, Economic and Cultural Impact of Aerospace

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Necessity for more education.<br>Safety of air travel. | Compare safety records of automobiles, trains, and aircraft. | | Statistics on safety records |
| Political impact.<br>National and international problems created by aviation's bringing together various:<br>Customs and conditions<br>Languages<br>Climatic conditions<br>Geographical relationship<br>Religious<br>Ideologies | Use newspaper and periodicals to cite problems resulting from bringing together of the various differences listed.<br>Report on these to class. | Teacher evaluation - oral reports. | Newspapers |
| Threat of supremacy of one nation.<br>Need for greater military defense.<br>Creation of NASA and related agencies.<br>Increase in international activities and agreements. | Discuss with class how the balance of power affects our government's workings.<br>Observe program by NASA space mobile.<br>See film: Return from Space and Benefits from Space | | Return from Space - NASA<br>Benefits from Space - NASA |
| Cultural impact.<br>Greater "mixing" of cultures.<br>Cooperation and exchange of ideas, customs, and cultural differences | Using references, write paper on recent cultural changes.<br>See film: International Skies | Teacher evaluation of written reports. | References given earlier<br>International Skies - FAA |

WORK COPY

UNIT TITLE: Social, Political, Economic, and Cultural Impact of Aerospace

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Stimulation of development of more primative ideas. | Listen to person who has lived in more primitive countries discuss aviation's role in the country's development.<br>Invite a parent, a person from another country, one from a different region of the nation, a senior citizen, a college student and a high school student to discuss, as a panel, personal values and reasons for these values.<br>Write paper on how your values have changed as you get older, and how exposure to new ideas aided in this change. | Teacher evaluation of written reports. | |
| Environmental impact.<br>Pollution vs pollution control:<br>Noise pollution<br>Air pollution | See films: Earth Resources Mission 73 and Can We Have a Little Quiet, Please<br>Using references, current periodicals, and newspapers, do research on problems and solutions of aviation related to pollution. Report findings to class. | | Earth Resources - Mission 73 NASA<br>Can We Have a Little Quiet, Please - FAA<br>References given earlier. |

WORK COPY

UNIT TITLE: Social, Political, Economic, and Cultural Impact of Aerospace

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Destruction of ecology in expanding and constructing ground facilities. | Listen to an expert speak on ecology as it related to aviation and its ground facilities. | Teacher - student evaluation. | |
| Preservation of ecology when expanding and constructing ground facilities. | | | |
| | See film: Space in the 70's | | Space in the 70's - NASA |
| | | Post test. | |

143

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE: 13.0499

TEACHING UNIT NO. IV - 43

TEACHING UNIT TITLE: Career counseling

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. list skills and type of training required for aerospace.
2. state possible places of employment for specific occupation.
3. describe methods he would employ in pursuing a given career.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II.

TEACHING UNIT LENGTH: 20 hours (2 hours per day)

EVALUATION: (1) Student-self evaluation, (2) teacher observation, (3) post unit test.

TEACHER COMPETENCY: Knowledge of resources related to career counseling

INSTRUCTIONAL MATERIALS

Visuals: Filmstrip - FSP-1 FAA Aviation - Where Career Opportunities Are Bright
Code #0494 Sanderson Careers in Aviation/Aerospace

Film - FA-06-70 FAA How to Succeed Without Really Flying

Books: - Aviation/Aerospace Fundamentals
Aeroscience - APR, Inc.

Consumables: - "Flying" magazine

GENERAL COMMENT: This unit is designed to aid students in determining if they should pursue a career in aviation.

WORK COPY

UNIT TITLE: Career Counseling

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. list aviation related jobs, with skills needed and type of training required.
2. state possible places of employment for specific occupations
3. describe method he would use if following a given career.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Occupations available in North Carolina: domestic scheduled airlines, local service lines, aircraft builders. | Make survey of occupations available in North Carolina. One day a week, work on the job training if possible. Report the results of one day on the job training to the class. | Student - self evaluation | |
| Types of jobs available in Airline operation, aircraft manufacturing, aircraft maintenance, airport operation, maintenance, etc. | Develop a career notebook. Study film and filmstrips: Careers in Aviation/Aerospace | Post unit test. | Film: FSP-1 FAA<br>Code - 0499 Sanderson<br>Film: FA-06-70 FAA<br>References<br>Superintendent of Documents<br>Aviation manufacture job description list. |
| Where to obtain knowledge and skills required - technical schools, four year colleges, military careers, on-job training. | Obtain job listing from airlines and manufacturers.<br>Invite counselors from industry, services, airlines, and the military to discuss requirement and careers.<br>Listen to and talk with counselors from technical schools and colleges. | | Current magazines |

WORK COPY

UNIT TITLE: Career counseling

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| | Plan a career listing course of study type of institution and possible job placement. | | Military recruiting service. |
| Job interview. | Listen to resource person from Employment Commission or industry. | | |
| | | Written unit test. | |

WORK COPY

PROGRAM AREA: Transportation Occupations

CAREER CLUSTER: Occupational Aerospace III OE CODE: 13.0499

TEACHING UNIT NO. IV - 44

TEACHING UNIT TITLE: Specialized Group Instruction

TEACHING UNIT OBJECTIVES: Upon completion of this unit, the student will be able to:

1. relate to the class experiences of a student selected aviation oriented self-study to gainful knowledge or expanded skills pertaining to the industry.

RECOMMENDED PREREQUISITES: Aviation Science I and II, Occupational Aerospace II

TEACHING UNIT LENGTH: 40 hours (2 hours per day)

EVALUATION: (1) Written examination, (2) teacher evaluation of projects.

TEACHER COMPETENCY: Ability to aid students in their selected areas.

INSTRUCTIONAL MATERIALS:

Visuals: - Laps related to subject areas

Equipment: - Student selects materials and equipment coinciding with specialized study.

GENERAL COMMENT: This unit is designed to allow students to select areas in which they would like to spend more time.

WORK COPY

UNIT TITLE: Specialized Group Instruction

STUDENT BEHAVIORAL OBJECTIVE: (Teaching Unit Objective) Upon completion of this unit, the student will be able to:

1. relate to the class experiences of a student selected, aviation oriented self-study to gainful knowledge or expanded skills pertaining to the industry.

| CONTENT | SUGGESTED LEARNING EXPERIENCES | SUGGESTED EVALUATION TECHNIQUES | SUGGESTED INSTRUCTIONAL MATERIALS |
|---|---|---|---|
| Suggested areas:<br>Meteorology<br>Navigation<br>Communications<br>High Speed Aerodynamics<br>Building an Aircraft<br>Aviation Related Shop work<br>Airport Management<br>Aviation Occupations<br>Man in Space<br>PAVE - Programmed Assistance to Vocational Education<br>Instrument Flight Training<br>Military Aviation<br>General Aviation<br>Commercial Aviation<br>Environmental Aerospace<br>Civil Air Patrol Squadron | Self-study.<br>Use LAPS related to your area.<br><br>Consult teacher. | Written examination.<br>Teacher evaluation of projects. | LAPS related to student-selected areas.<br><br>PAVE - Cessna Aircraft Company<br><br>See references and resources<br><br>Local C.A.P. Squadron or State Commander. |

Instructional Resources Aerospace Sections I, II, III, IV

A. Text

1. Aeroscience, Misenhimer, Ted G., Aero Products Research, Inc., 11811 Teale Street, Culver City, Calif., 90230, 1970.

2. Aerospace Education Text Booklets, National Headquarters, Civil Air Patrol, Maxwell AFB, Alabama, 36112

3. An Introduction to General Aeronautics, Van Deventer, C.N., American Technical Society, 848 E. 58th Street, Chicago, Illinois, 60637, 1970.

4. Aviation/Aerospace Fundamentals, Sanderson Times Mirror, 8065 E. 40th Avenue, Denver, Colorado, 80207, 1971.

B. Suplementary references:

5. Above and Beyond, New Horizons Publishers, Inc., 154 E. Erie Street, Chicago, Illinois, 60611, 1968.

6. Aeronautical Science Course of Study, FAA Above

7. Airmen's Information Manual, Superintendent of Documents, U.S. Government Printing Office, Division of Public Documents, Washington, D. C.20402, 1972.

8. An Introduction to Aerospace Education, General Aviation Manufactures Association, Inc., Suite 1200-A, 1025 Connecticut Avenue, N.W., Washington, D. C., 20036, 1968.

9. Aviation Weather, Federal Aviation Administration, P. O. Box 20636, Atlanta, Georgia, 30320, 1965.

10. Biology, NASA Above

11. Classic Monoplanes, Shamburger, Page, Crown Publishers, Inc., 419 Park Avenue, South, New York, N. Y. 10016.

12. Experimental Aircraft Association Manuals, Experimental Aircraft Association, P. O. Box 229, Hales Corner, Wisconsin,53130, 1970.

13. Exploring in Aeronautics, National Aeronautics and Space Administration, Langley Research Center, Langley Station, Hampton, Virginia, 23363, 1971.

14. Exploring in Aerospace Rocketry, National Aeronautics and Space Administration, Langley Research Center, Langley Station, Hampton, Viringia, 23263, 1971.

15. Flight Instructor's Handbook, F.A.A. Above

16. Flight Training Handbook, F.A.A. Above

17. Fundamentals of Aviation and Space Technology, Applegate, L. Burnell and others, The Institute of Aviation, University of Illinois - Willard Airport, Savoy, Illinois, 61874, 1971.

18. Guide to Conceptual Approach in Aerospace Education, NASA Above

19. Instrument Flying Handbook, F.A.A. Above

20. Life Science in a Space Age Setting, NASA Above

21. Private Pilot's Handbook to Aeronautical Knowledge, Federal Aviation Administration, P. O. Box 20636, Atlanta, Georgia, 30320, 1970.

22. Space Science, NASA Above

23. Tracks Across the Sky, Shamburger, Page, J. B. Lippincott Company, East Washington Square, Philadelphia, Pennsylvania, 19105.

Other resources and suggestions:

1. Aviation Education Bibliography, National Aerospace Education Council 616 Shoreham Building, 806 15th Street, N. W., Washington, D. C. 20005.

2. Aerospace Bibliography, same as above

3. Federal Aviation Administration Film Catalog, Federal Aviation Administration, P. O. Box 20636, Atlanta, Georgia, 30320.

4. Air Force Film Library, USAF Central Audio - Visual Center, Norton AFB, California, 92409.

5. Aviation Aerospace Education Catalog, Sanderson Times, 8065 E. 40th Avenue, Denver, Colorado, 80207.

6. Navy Film Library, 6th Naval District, U. S. Naval Base, Charleston, South Carolina, 29408.

7. Aero Products Research, Inc. 11811 Terle Street, Culver City, California.

8. NASA Film List, National Aeronautics and Space Administration, Langley Research Center, Langley Station, Hampton, Virginia, 23363.

9. Modern Talking Picture Service, 1212 Avenue of the Americas, New York, New York, 10036.

10. Sterling Movies, Inc., 43 West 61st Street, New York, New York, 10023.

11. Eye Gate House, Inc., 246-01 Archer Avenue, Janraria, New York, 11435.

12. Shell Oil Company, 450 N. Meridian Street, Indianapolis, Indiana, 46204.

13. Bell Telephone and Telegraph, Contact local office.

14. Commercial Airlines:
United Airlines, School and College Department, P. O. Box 66141, Chicago, Illinois, 60666
Eastern Airlines, c/o "Sunrise at Eastern", 10 Rockefeller Plaza. New York, New York. 10020.
Delta Airlines, Film Department, Atlanta Airport, Atlanta, Georgia 30320.
Piedmont Airlines, Smith - Reynolds Airport, Winston-Salem, North Carolina 27102.

15. Cessna Air Age Education, Cessna Air Craft Company, Aviation Education Department, P. O. Box 1521, Wichita, Kansas 67201.

16. Beech Aircraft Cooperation, Aviation Education Department, Wichita, Kansas 67201.

17. Piper Aircraft Corporation, Lock Haven, Pennsylvania, 17745.

18. National Aerospace Education Council, 806-15th Street, N. W., Room 616 Washington, D. C. 20005.

19. North Carolina Aviation Specialist, Department of Transportation.

20. Superintendent of Documents, U. S. Government Printing Office, Division of Public Documents, Washington, D. C. 20402.

21. Pan American Navigation Service, Inc., 12021 Ventura Blvd. No. Hollywood, California, 91604.

22. Felsenthal Instruments Company, A V Training Division, 11940 Quay Street, Broomfield, Colorado, 80020.

23. Local Experimental Aircraft Association.

24. Fixed Base Operators.

25. Pilots Association.

26. Aero clubs.

27. Model plane clubs.

28. Civil Air Patrol Squadrons.

29. Air Force Recruiters.

30. Retired Air Service Personnel.

31. North Carolina Aviation/Aerospace Education Committee, Department of Education.

32. Army Pilot or Airplane owner. 151

33. Air Force Bases

34. Air National Guard

35. Air Force ROTC units

36. National Weather Services

37. General Aviation Manufactures Association, Suite 1200-A, 1025 Connecticut Avenue, N. W., Washington, D. C. 20036.

38. Aircraft owner's manuals

39. All aircraft manufactures

40. Magazines:

Air Forces, Tear Siegler, Inc., Astronics Division, 3171 South Bundy Drive, Santa Monica, Calif. 90406.
Air Progress, Petersen Publishing Co., 8490 Sunset Blvd., Los Angeles, Calif. 90069.
Flying, Ziff-Davis Publishing Co., One Park Avenue, New York, N. Y. 10016.
Plane and Pilot, Werner and Werner Corp., 631 Wilshire Boulevard, Santa Monica, Calif. 90401.
The AOPA Pilot, Aircraft Owners and Pilots Association, 7315 Wisconsin Avenue, Bethesda, Maryland 20014.
American Aircraft Modeler, Potomac Aviation Publications, Inc., 733 Fifteenth Street, N. W., Washington, D. C. 20005.

C. Audiovisual

| Films | Session Number | Cost | Vendor |
|---|---|---|---|
| Aeronautical Oddities<br>20 min. B & W 1961 | WF 0036 | Free Loan | Film Library, AC-445,<br>F.A.A.<br>P. O. Box 25082<br>Oklahoma City, Oklahoma<br>73125 |
| How An Airplane Flies<br>18 min. Color 1969 | FA-703 | Free Loan | F.A.A. |
| Basic Radio Procedures for Pilots<br>30 min. 1970 | FA-902 | Free Loan | F.A.A. |
| Rx for Flight<br>20 min. 1968 | FA-606 | Free Loan | F.A.A. |
| Medical Facts for Pilots<br>25 min. 1970 | FA-01-70 | Free Loan | F.A.A. |
| Charlie<br>22 min. 1967 | FA-618 | Free Loan | F.A.A. |

C. Audiovisual cont'd.

| Films | Session Number | Cost | Vendor |
|---|---|---|---|
| Today for Tomorrow<br>14 1/2 min. 1965 | FA-907 | | F.A.A. |
| The Wind is Right<br>28 min. 1971 | FAC-135 | | F.A.A. |
| Transport Crash Safety Test - Parts 1 & 2<br>15 min. & 26 min<br>1964 | FA-515<br>FA-615 | | F.A.A. |
| Stable and Safe<br>20 min. 1959 | FA-704 | | F.A.A. |
| Brother<br>13 1/2 min. 1970 | FA-01-71 | | F.A.A. |
| How to Succeed Without Really Flying<br>28 min. 1970 | FA-06-70 | | F.A.A. |
| Aviation Mechanic<br>17 min. | FA-315 | | F.A.A. |
| Aviation Workshop<br>29 min. | FAA-605 | | F.A.A. |
| The Flight Service Station<br>28 min. 1969 | FA-901 | | F.A.A. |
| What's My Traffic<br>25 min. 1962 | FA-201 | | F.A.A. |
| Air Navigation<br>25 min. 1970 | FA-02-70 | | F.A.A. |
| Basic Radio Procedures for Pilots<br>30 min. 1970 | FA-902 | | F.A.A. |
| This is Vortac<br>15 min. 1959 | FA-104 | | F.A.A. |
| The Cold Front<br>15 min. 1962 | FAN-103 | | F.A.A. |
| The Warm Front<br>20 min. 1962 | FAN-104 | | F.A.A. |

C. Audiovisual cont'd.

| Films | | Session Number | Cost | Vendor |
|---|---|---|---|---|
| Fog and Low Ceiling Clouds - Avection Fog and Ground Fog<br>25 min. | 1962 | FAN-101 | | F.A.A. |
| Fog and Low Ceiling Clouds - Upslope Fog and Frontal Fog<br>10 min. | 1962 | FAN-102 | | F.A.A. |
| Flight<br>28 min. | | FA-117 | | F.A.A. |
| Path to Safety<br>20 min. | 1967 | FA-612 | | F.A.A. |
| Can We Have a Little Quiet, Please<br>14 1/2 min. | 1971 | FA-02-71 | | F.A.A. |
| International Skies<br>5 min. | 1969 | FA-904 | | F.A.A. |
| One Eye on the Instruments<br>16 min. | 1962 | FA-209 | | F.A.A. |
| From Kitty Hawk to Aerospace<br>21 min. | 1965 | SFP-1240 | Free Loan | U. S. Air Force<br>Audio - Film Library<br>Norton AFB, Calif.<br>92409 |
| Landing Weather Minimums Investigation<br>22 min. | 1967 | FR-878 | | A.F. |
| Avionic Maintenance Safety<br>16 min. | 1969 | TF-6132 | | A.F. |
| Pre-flight and Visual Inspection<br>12 1/2 min. B & W | 1956 | FTA-1746 | | A.F. |
| Aerial Navigation Map Reading<br>21 min. B & W | 1945 | TFI-3460 | | A.F. |
| Primary Pilot Navigation<br>27 min. | 1955 | TF-1-4990 | | A.F. |

C. Audiovisual cont'd.

| Films | Session Number | Cost | Vendor |
|---|---|---|---|
| Winds and the Navigator<br>15 min. 1957 | TF-1-5206b | | A.F. |
| Man of Maintenance - Southeast Asia<br>15 min. 1968 | SFP-1571 | | A.F. |
| The Case of the Million Dollar Pliers<br>24 min. 1964 | SFP-1263 | | A.F. |
| Aero-Medical Research<br>27 min. 1957 | SFP-390 | | A.F. |
| Aerodynamics - Air Flow<br>18 min. B & W 1941 | TF1-160 | | A.F. |
| Aerodynamics - Forces Acting on an Air Foil<br>26 min. B & W 1941 | RF1-161 | | A.F. |
| High Speed Flight - Approaching the Speed of Sound<br>27 min. 1959 | TF1-5340 | | A.F. |
| High Speed Flight - Transonic<br>20 min. 1959 | TF1-5341 | | A.F. |
| High Speed Flight - Beyond the Speed of Sound<br>20 min. 1962 | TF-5550 | | A.F. |
| It Takes a Man<br>26 min. B & W 1953 | TF1-4804 | | A.F. |
| How an Airplane Flies<br>34 min. B & W 1953 | TF1-4805 | | A.F. |
| Beyond the Stick and Rudder<br>14 min. B & W 1959 | TF1-5300 | | A.F. |
| Helicopter Orientation<br>27 min. B & W 1952 | TF1-5181 | | A.F. |
| AAAARK - Something About Communication | | | A.F. |
| The Aircraft Called Seventy 31 min. | SFP-1158 | | A.F. |

C. Audiovisual cont'd.

| Films | Session Number | Cost | Vendor |
|---|---|---|---|
| Unchained Goddess | | Free Loan | Bell Telephone and Telegraph Local Offices |
| Do's and Don'ts | | Free Loan | Teledyne Continental Motors, Suite 1200-A 1025 Connecticut Avenue N.W., Washington, D. C. 20056 |
| Flight Without Wings 14 1/2 min. 1969 | | Free Loan | National Aeronautic and Space Administration, Langley Research Center, Langley Station, Hampton, Va. 23363 |
| Research Project X-15 27 min. 1966 | | | NASA |
| Space Down to Earth 27 1/2 min. 1970 | | | NASA |
| The Vital Link 28 1/2 min | | | NASA |
| Returns from Space 27 min. 1966 | | | NASA |
| Benefits from Space 10 min. 1969 | | | NASA |
| Earth Resources - Mission 73 20 min. 1969 | | | NASA |
| Space in the 70's Man in Space - The Second Decade 28 min. 1971 | | | NASA |
| Spin-offs into Space | | | NASA |
| Universe-1960 28 min. | | | NASA |
| The Mastery of Space 58 min. 1962 | | | NASA |
| America in Space - The First Decade 28 min. 1968 | | | NASA |
| Before Saturn 14 min. 1962 | | | NASA |

C. Audiovisual cont'd.

| Films | Session Number | Cost | Vendor |
|---|---|---|---|
| Friendship 7<br>58 min. 1962 | | | NASA |
| Space Navigation<br>21 min. 1967 | | | NASA |
| Living in Space - Parts 1 and 2<br>13 min. 1967<br>20 min. 1967 | | | NASA |
| International Cooperation in Space<br>23 min. 1965 | | | NASA |
| Ariel - The First International Satellite<br>13 min. 1963 | | | NASA |
| By-Products of Space Research<br>16 1/2 min. 1967 | | | NASA |
| High Speed Flight (3)<br>27 1/2 min.<br>20 min.<br>19 min. | | Free Loan | Shell Oil Company<br>450 N. Meridian St.<br>Indianapolis, Ind. 46204 |
| ABC's of Jet Propulsion | | | Modern Talking Pictures Service<br>1212 Ave. of the Americas<br>New York, N. Y. 10036 |
| Engineer - Man of Destiny<br>30 min. | | Free Loan | |
| The Flight Decision<br>15 min. | | Free Loan | National Association of State Aviation Officials<br>Suite 1002, 1000 Vermont Ave., N.W., Washington, D. C. |
| Air Cargo - A Modern Marketing Tool<br>15 min. | | Free Loan | United Aircraft Corp.<br>400 Main Street<br>East Hartford, Conn. 01608 |
| Our Shrinking World - Jet Pilot<br>17 min. | | $180.00<br>Rental: $6 | Encyclopedia Britanica Educational Corp.<br>425 N. Michigan Avenue<br>Chicago, Ill. 60611 |

C. Audiovisual cont'd.

| Films | Session Number | Cost | Vendor |
|---|---|---|---|
| Turboprop/turboshaft Engines<br>13 min. 1959 | MN-8812A | Free Loan | U. S. Navy<br>6th. Naval District<br>U. S. Naval Base<br>Charleston, S. C.<br>29408 |
| Crosswind Approach Landings and Takeoffs<br>8 min. B & W 1953 | MN-7398C | Free Loan | U. S. N. |
| Before You Fly<br>13 min. B & W 1953 | MN-7398A | Free Loan | U. S. N. |
| Holes in Our Pockets<br>15 min. | | $15.00 | Sales Training Association<br>P. O. Box 5172<br>Wichita, Kansas 67218 |

C. Audiovisual cont'd.

| Filmstrips | Vendor |
|---|---|
| Aircraft Ignition Systems | Sanderson Times Mirror<br>8065 E. 40th Avenue<br>Denver, Colorado 80207 |
| Airplane Performance | |
| Careers in Aviation and Aerospace | |
| Airports | |
| Airspace Utilization | |
| Aircraft Ground Operations | |
| Basic Flight Maneuvers | |
| Private Pilot - Federal Aviation Regulations and Space Utilization | |
| Advanced Meteorology | |
| Computer 2 | |
| Private Pilots Airplane Maneuvers | |
| IFR Flight Charts | |
| IFR Planning and VOR Flight | |
| IFR Regulations and Procedures | |
| IFR Clearance Shorthand | |
| Science of Flight | |
| Weight and Balance - Parts A, B, and C | |
| Flight Control Systems and Instruments | |
| Flight Computer | |
| Radio Communications | |
| Air Traffic: Control and Communications | |
| Meteorology Series | |
| Reciprocating Engine and Related Systems | |
| Aviation History | |
| The Path of Least Resistance | |
| Airplane Systems and Instruments | |

C. Audiovisual cont'd.

| Filmstrips | Vendor |
|---|---|
| Communications | |
| Physiology of Flight | |
| Basic Navigation | |
| Basic Flight Computer | |
| Aviation: Where Career Opportunities are Bright | Federal Aviation Administration<br>Film Library, AC-445<br>P. O. Box 25082<br>Oklahoma City, Oklahoma 73125 |
| The Atmosphere | |
| Air Masses | |
| Looking Ahead | Piper Aircraft Corp.<br>Lock Haven, Pa. 17745 |
| Training for Perfectionists | Air France<br>% Dept. Anin. LA.<br>1350 Avenue of the Americas<br>New York, N. Y. 10019 |
| The Dawning Space Age | Civil Air Patrol<br>National Headquarters<br>% Bookstore<br>Maxwell AFB, Ala. 36112 |
| Don't Build That Rocket Alone | National Aeronautics and Space Administration<br>Langley Research Center<br>Langley Station<br>Hampton, Virginia 23365 |
| The Airplane Changes America | Eye Gate House, Inc.<br>146-01 Archer Avenue<br>Jamaica, N. Y. 11435 |

| Transparencies | Vendor |
|---|---|
| Flight Computer | Sanderson Times Mirror<br>8065 E. 40th Avenue<br>Denver, Colo. 80207 |
| Navigation | |
| Radio Navigation 1. Omni 2. VOR 3. Advantages 4. ADF | |
| Flight Computer - Windside | |

C. Audiovisual cont'd.

| Transparencies | Vendor |
|---|---|
| The Four Strokes | |
| Propeller | |
| Power Source | |
| Weight and Balance | |
| Computer Side | |

| Slides | Vendor |
|---|---|
| Power for Aircraft | Civil Air Patrol<br>National Headquarters<br>% Bookstore<br>Maxwell AFB, Ala. 36112 |

TOOL AND EQUIPMENT LIST

| Description | Quantity | Cost | Total Cost |
|---|---|---|---|
| Work Benches | | | |
| Work Tables Build | | $ 100.00 | $ 100.00 |
| Compressor | 1 | 200.00 | 200.00 |
| Spray Gun | 1 | 40.00 | 40.00 |
| Grinder | 1 | 50.00 | 50.00 |
| Jig Saw | 1 | 100.00 | 100.00 |
| Belt and Disc Sander | 1 | 100.00 | 100.00 |
| Saber Saw | 1 | 50.00 | 50.00 |
| Electric Hand Drill | 1 | 40.00 | 40.00 |
| Clamps Bar | 2 | 5.00 | 10.00 |
| Clamps (Hand Screw) | 4 | 5.35 | 21.40 |
| Clamps "C" (Small assorted) | 24 | 1.20 | 25.80 |
| Pinking Shears | 1 | 7.50 | 7.50 |
| Guages (Feeler) | 2 | 1.82 | 3.64 |
| Guages (Gapping) | 2 | .50 | 1.00 |
| Hammers (Ball Pein) | 2 | 1.85 | 3.70 |
| Wrench Sets | 2 | 100.00 | 200.00 |
| Screwdriver Set (Standard) | 2 | 5.00 | 10.00 |
| Screwdriver Set (Phillips) | 2 | 6.73 | 13.46 |
| Aviation Snips L.H. | 1 | 2.24 | 2.24 |
| Aviation Snips R.H. | 1 | 2.24 | 2.24 |
| Aviation Snips-Straight | 1 | 2.24 | 2.24 |
| Vise Pipe | 1 | 16.18 | 16.18 |
| Vises-woodworking | 2 | 16.21 | 32.42 |
| Vise Machine | 1 | 30.00 | 30.00 |
| Wrench Torque | 1 | 15.00 | 15.00 |
| Saws-Hack | 2 | 2.50 | 5.00 |
| Saws-Crosscut (10 pts.) | 2 | 5.50 | 11.00 |
| Saws-Coping | 4 | .75 | 3.00 |
| Saws-Buck | 1 | 4.20 | 8.40 |
| Plane Block | 2 | 4.50 | 9.00 |
| Plane Smooth | 2 | 7.50 | 15.00 |
| Square Framing | 2 | 4.00 | 8.00 |
| Square Combination | 2 | 3.00 | 6.00 |
| Riveting Tool | 1 | 12.00 | 12.00 |
| Files Flat | 6 | 1.10 | 16.60 |
| Files Round | 6 | 2.00 | 12.00 |
| Files Half Round | 6 | 1.50 | 9.00 |
| Easy Cuts | 2 | 5.00 | 10.00 |
| Drill Sets | 2 | 28.00 | 56.00 |
| Stapler | 1 | 12.00 | 12.00 |
| Mallet | 2 | 2.20 | 4.40 |
| Paint Brushes (Assorted) | | 20.00 | 20.00 |
| Steel Brushes and Miscellaneous Cleaning Equipment | | | 25.00 |
| Soldering Iron | 2 | 11.25 | 22.50 |
| Soldering Gun | 2 | 8.00 | 16.00 |
| Miscellaneous Measuring and Test Equipment | | | 50.00 |
| Rivet and Welding Equipment | | | 200.00 |

AIRCRAFT

| | Cost |
|---|---|
| Engines - opposed | Government Surplus |
| Radial | " |
| Engine parts and accessories | " |
| Engine stands | " |
| Engine instruments | " |
| Flight instruments | " |
| Aircraft parts | " |
| Aircraft unflyable | $ 500.00 |
| Tools and equipment | 1,570.82 |
| Instructional materials | 1,000.00 |
| Expendable supplies (per year) | 200.00 |
| Total | $ 3,270.82 |